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## DEPARTMENTAL CIRCULAR

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No. 2

## RECEIVING A VISITOR.

When a stranger enters an office of this department and asks for some one or seeks information, we do not know whether he has simply walked across the grounds or whether he has traveled miles by train in search of some information he supposes the department can supply. In final analysis it makes little difference whence he comes or how far he has traveled. As a citizen he is one of the department's employers and is entitled to the fullest measure of help, within its function, that the department can give.

The first thing that the department owes the visitor is a courteous reception. The employee who greets him can make him feel at home by sounding at once the note of service which dominates the policy of this department. If he asks the stranger gruffly, "What is it?" this employee has begun to give a false idea of the real work and aims of the Department of Agriculture. How much pleasanter, easier, and better it would be first to learn the visitor's name and then to inquire, "What can we do for you, Mr. Doe?" Once a visitor's name is known, it is much easier to make the conversation personal and to avoid roundabout phrases, the one purpose of which is to avoid calling him "Mister." The name of the visitor may also give important clues and save further questioning.

Mr. Doe may reply that he wants to see Dr. Blank. Dr. Blank may be out or may be so engaged on important matters that he is not accessible. A curt "He is out of town," or "He is engaged and can't be seen to-day" may be entirely true, but it stops short of real service. "I am sorry that he is engaged and can not be seen to-day" is an improvement, but it would be better still if the employee, without appearing to be overinquisitive, should try by polite and careful questioning to discover whether the matter on which the visitor desires to see Dr. Blank is not one on which one of Dr. Blank's assistants could very well give him the information he seeks. Very frequently strangers have been sent here to see Dr. Blank as having knowledge of a particular subject. They often think that Dr. Blank is the only one in the department who knows anything about this subject, because very few people have a clear understanding of our organization or appreciate that many specialists work on the same subject. A few polite questions will develop quickly from an ordinary visitor whether or not his business with Dr. Blank is personal. A good opening for such a conversation would be something like this: "If you are seeking information on some agricultural subject we can introduce you to one of Dr. Blank's assistants, who will be glad to give you such information as he can. This perhaps would save you the trouble of returning or spare delay in obtaining what you wish."

If a visitor refuses to give any clue as to what he is seeking, or insists flatly that he wants to see Dr. Blank personally, the representative of the department who has received him should not attempt to argue with him and should under no circumstances become impatient or lose his temper. In such cases all that can be done is to say courteously, "I am

sorry that it will be impossible for you to see Dr. Blank to-day. If you care to return, he probably will be at liberty to see you to-morrow." Where, however, the person is one who clearly might have real business with Dr. Blank, care should be taken to take his name and address, and his telephone number if in the city, so that Dr. Blank can arrange an appointment with him if it is desirable. If the visitor shows a disposition to be unreasonable, unfeeling courtesy is the most effective weapon against his unreasonableness and is, after all, the simplest way of stopping his interruption of work.

There is still another type of visitor—one who does not wish to see anybody in particular but wants to get information somewhere about some problem. It is obvious that this type of visitor should be handled with particular care. He may not be able to state in very definite terms what he wants to learn. The one receiving him, therefore, must needs take pains to help him make clear his need. Cases have come to knowledge where the one receiving the visitor was in such a hurry to get rid of him that he took no pains really to learn what the caller needed. For example, a visitor may begin, "I want to learn something about the soil on my farm." "Oh, then you should consult the Bureau of Soils over in the East Wing," is a very quick way of getting rid of him. In many a case of this kind a little more patience and a few questions will make plain that the information the farmer seeks is not at all a question for the Bureau of Soils, but some question of fertility or rotation clearly within the province of one of the offices or laboratories of another bureau. Cases have been known where a visitor has been passed on from one bureau to another until he has seen four different people, each of whom has referred him forward with only half his story heard. Possibly it was not until he reached the fourth office that he found the information sought. This process not only wastes the time of the visitor and makes him dissatisfied or angry, but also wastes the time of every specialist to whom he has been wrongly referred. If the first person who receives a visitor takes the trouble to find out the exact information he seeks and sends him directly to the specialist who has charge of this phase of agriculture, the department's reputation for efficiency will be enhanced and much waste motion and irritation saved.

Even in cases where the full story of the visitor is known there is a tendency, when the department representative is not certain, to send the visitor almost at random in the direction in which the employee "guesses" the information ought to be. A glance at the "Organization of the Department of Agriculture" or the "Program of Work" would enable accurate reference. If these indices to the department do not give a definite answer, one or two calls over the inside telephone will secure it. It is much better to get the information this way than to send the visitor marching from this to that bureau, wasting his own time and the time of every one whom he sees, until our guest finally is satisfied or allowed to leave in a disgruntled frame of mind.

*Carl T. Swanson*

Assistant Secretary.



## SAVING STATIONERY.

(Contribution from the Assistant Secretary's Office.)

From an informal memorandum recently referred to the Assistant Secretary is taken, verbatim, the following paragraph, as worthy of being referred to every member of the personnel, and in particular those who have anything to do with the selection of stock for department stationery:

"I suggest that we publish in the Departmental Circular at some convenient time an article advocating economy and care in the use of stationery and supplies. From my observation I know there is much thoughtless waste and extravagance in the department, and it is not confined to clerks and minor employees. Envelopes, sometimes of expensive quality, are often used when they are not at all necessary, or where an inferior grade would answer the purpose. Letters from one office to another in the department are written on good stationery when a cheap memorandum sheet would do just as well. Other instances could be mentioned. A common idea is that 'Uncle Sam pays the bills, so what do we care?' I believe we should follow the standard that would be set by a capable business man in carrying on his own business."

In view of the practices noted in the above-mentioned memorandum, practices which anyone familiar with the routine work of the department must recognize as being common, if not the rule, it would appear that a considerable saving might be effected each year by the exercise of further care in the matter of stationery, both as to purchase and use.

There are certain common-sense principles that should be followed in this regard. For example, it should be the rule that all paper intended for purely ephemeral service, such as informal memorandum paper, stock for press bulletins and envelopes for intra-departmental mail, should be on the cheapest grade that will give practical service. The mere appearance of the stock should not be a factor in the choice of paper for such purpose. There is no occasion for using high-grade rope manila envelopes for intra-departmental mail when cheap wood manila envelopes will give adequate service, or for paying 12 cents per pound for memorandum paper when manila or other low-grade paper that will serve the purpose can be bought for less than half that price.

In the choice of paper for formal official correspondence quality of stock rather than weight should ordinarily be the criterion. As a rule, the thinnest paper that will work well under the typewriter and stand erasure and correction should be chosen. If so-called "18-pound" paper will stand that test it should ordinarily be chosen rather than 24-pound paper of the same grade, since the lighter paper costs one-third less than the other per ream.

*THE DEPARTMENTAL CIRCULAR is issued as a convenient means of intercommunication of official information among the personnel of the Department of Agriculture. Its circulation, therefore, will be limited to those having official connection with the department. Its editorial policy will be determined wholly by the specific class of readers for whom it is published and, therefore, may depart somewhat from the editorial policy governing material issued for the public. While the material to be published will by no means be confidential, the department can not extend the circulation of this publication beyond its own employees and official collaborators.*

Under the law (Public No. 82, 63d Cong.) all paper for the public printing and binding must be furnished by the Public Printer, who will keep in stock such paper as in his judgment is most suitable and economical. The Division of Publications is authorized to confer with him in the selection of paper for all kinds of department printing. As regards letter heads, an effort has already been made to standardize the paper, and white bond, 18-pound paper, 40 cents per ream, has been selected and is now being used, and is being found very satisfactory, with a considerable saving effected.

The Division of Publications always stands ready to give technical advice as to how saving may be effected in the matter of paper stock for publications and for such printed stationery and blanks as are handled through the division, and the final decision may safely be left to that office. In the matter of blank paper for carbon copies, etc., where no printing is required, the Supply Division is prepared to give like advice.

It remains for the individual member of the personnel, however, to effect the major saving in mere minor ways. If every member of the personnel were to use the Government stationery as though it were his own, and paid for out of his own pocket (as indeed it is), there would be far less waste of department stationery than that which has called forth the above-quoted memorandum. Then paper would be used in the light of the fact that people pay the bills, rather than with the easy prodigality which hangs on the assumption that "Uncle Sam pays the bills," and that, therefore, expense is no consideration.

It is highly necessary that the farmer, as well as any other business man, should know at all times just how his business stands, what parts are profitable, what unprofitable, and how he should redirect his activities to assure success. For this purpose the farm must of necessity be looked upon as a whole.—Annual Report, 1914.

## VISIT OF DR. F. KØLPIN RAVN.

Upon the invitation of this department, transmitted through the Department of State, Dr. F. Kølpin Ravn, of Denmark, is visiting the United States and conferring with pathologists of the Department of Agriculture and State experiment stations especially in regard to the leaf disease of barley, but with general reference also to the various diseases of cereals and to the breeding of cereals.

Dr. Ravn arrived in New York May 6 and has since visited the agricultural colleges and experiment stations of New Jersey, Massachusetts, Pennsylvania, New York, Indiana, Wisconsin, Nebraska, and Kansas. He is now attending the meeting of specialists on diseases of cereals held at Berkeley and Davis, Cal., and later will visit department substations and other state agricultural colleges and experiment stations.

The itinerary which has been arranged for Dr. Ravn is as follows:

Medford, Oreg.....	June 9
Corvallis, Oreg.....	June 10
Portland, Oreg.....	June 11
Puyallup, Wash.....	June 12-13
Moro, Oreg.....	June 14-16
Spokane, Wash.....	June 18
Pullman, Wash.....	June 19
Moscow, Idaho.....	June 20
Butte, Mont.....	June 21
Aberdeen, Idaho.....	June 22-23
Gooding, Idaho.....	June 24
Logan, Utah.....	June 25-26
Salt Lake City, Utah.....	June 27
Nephi, Utah.....	June 28-29
Cheyenne, Wyo.....	June 30-July 1
Denver, Colo.....	July 2
Akron, Colo.....	July 3
Hays, Kans.....	July 4
North Platte, Nebr.....	July 6
Lincoln, Nebr.....	July 7
Omaha, Nebr.....	July 7
Huron, S. Dak.....	July 8
Highmore, S. Dak.....	July 8
Brookings, S. Dak.....	July 9-10
Minneapolis, Minn.....	July 11-12
Fargo, N. Dak.....	July 13
Mandan, N. Dak.....	July 14-16
Dickinson, N. Dak.....	July 17
Billings, Mont.....	July 18
Bozeman, Mont.....	July 19
Moccasin, Mont.....	July 20-21
Williston, N. Dak.....	July 22-23
Fargo, N. Dak.....	July 24
Madison, Wis.....	July 25-26
Arrive Washington, D. C.....	July 28

Good roads are equally intimately related both to the production and distribution of farm products. They are prerequisite not only to economical production and distribution but also to the promotion of the broader life of the communities. The great need, obviously, is for roads which shall get products from the farm to the nearest railway station, enable the farmer to haul when he can not sow and reap, and to haul at a lower rate, to transport his children to consolidated schools, and to enjoy comfortably his social enterprises.—Annual Report, 1914.



## PREPARING MANUSCRIPT.

(Contribution from the Division of Publications.)

The simple suggestions for the mechanical preparation of manuscripts for publication given below will simplify and facilitate the work of the editors, make possible more expeditious filing of copy with the printer, secure more prompt delivery of proofs, and greatly reduce charges for and delay from corrections. Where any one of these suggestions is disregarded, it compels the editors to repair the omission or makes necessary difficult interlineations. The suggestions, if generally followed, would, it is believed, bring about a desirable standardization of manuscripts.

Copy should be typewritten with a record ribbon, and should be double spaced to permit legible corrections, with a marginal space of 1 inch.

Typewrite only on one side of the paper, the sheets of which should be of uniform size, preferably 8 by 10½ inches.

Sheets should not be pasted together and then folded to letter size.

Manuscripts and illustrations should not be folded or rolled, but should be kept flat and transmitted to the Division of Publications in an envelope or secure cover.

Interlineations should, as far as possible, be avoided. If absolutely necessary, however, they should be made in ink. If more than a few words, they should be typewritten on a slip of paper and pasted to the margin of the manuscript and a line drawn to indicate the place of insertion. Plain, legible copy contributes to prompt and economical handling.

All paragraphs should be indented at least seven spaces on the typewriter. If, in carefully reading the manuscript, further paragraphs are necessary, they may be indicated by the symbol ¶.

Quotations should be written solid and should be indented 15 spaces for the first line and 10 spaces for the succeeding lines, as follows:

"for all necessary expenses in the investigation of fruits \* \* \* tobacco \* \* \* and other plants and plant industries in cooperation \* \* \* with other branches,

A footnote should be written solid immediately below the line of the text in which the reference occurs, with a line drawn entirely across the page above it and another line below it. The word "footnote" should be written at the beginning of the first line of the matter to which it refers.

References to footnotes should be indicated by the use of superior figures, thus <sup>1</sup>. Footnotes to tables should be written under the tables and referred to by superior letters, as <sup>a</sup>.

References to books from which extracts are made or to books to which the writer refers for further information should be made in footnotes, as, for example, "Atkinson, G. F. Studies of American Fungi: Mushrooms, Edible, Poisonous, etc., ed. 2, New York, 1903, p. 167."

A manuscript should not be submitted for publication until it has been examined by every official or employee who should see it, and not until it has been approved by the chief of the bureau. This will avoid changes in the proof, which are costly and should be avoided. Much of the delay and expense of printing bulletins is due to correcting in the proof inaccuracies that should have been detected in the manuscript.

### PHOTOGRAPHS AND DRAWINGS.

All photographs or drawings to be used for copy for illustrations should accompany the manuscript, preferably assembled together at the end. Neither photographs nor drawings should be folded, nor should they be pasted or attached by clips to a sheet of paper or cardboard, as the indentation made by the clips in the originals, especially photographs, may show in the reproduction. Photographic prints should be attached to letter-size paper by means of pasters across the corners, or by inserting the corners through slits cut in the paper.

Write numbers and legends for both plates and text figures on copy for illustrations below the photographic print or drawing. Indicate on margin of text where illustrations are to be inserted. When subject admits, copy for a small outline map of the United States, showing territory to which proposed bulletin applies, should be submitted with manuscript.

The size and method of reproduction of illustrations should be left for decision to the Division of Publications.

Every table should have an appropriate heading.

### INTRODUCTORY MATERIAL.

Titles of papers should be as brief as they can be made.

A table of contents and a list of illustrations should be furnished, and may be used in whole or in part if found economical or convenient to do so.

A brief note should be furnished with every manuscript, stating the scope and character of the same, for whom intended, and the districts or sections of the country to which the publication is particularly applicable.

A list of publications of the department on kindred subjects should be submitted with every manuscript.

The type to be used in headings and in text should be left to the decision of the Division of Publications. The relative importance of the headings should be indicated in the manuscript by underscoring with

three lines the principal headings, underscoring with two lines the first series of subheadings, and underscoring with one line the second series of subheadings. Side headings should be used only for single paragraphs, and where so required should be written at the beginning of the paragraph. Center headings should be preceded and followed by triple spaces on the machine. This preparation will be helpful to the editors in the Division of Publications in the selection of proper type.

In matters of capitalization, abbreviation, punctuation, hyphenating of words, etc., the style adopted by the Government Printing Office, by law, should be followed.

All bibliographical lists should conform to the style adopted by the Department Librarian.

Proper names, foreign words, and technical terms should be written plainly and verified. If corrections are made, print them; thus: TOLSTOI; LEPIDOPTERA; etc.

Illegible figures should be rewritten, and corrections of figures should not be written over the originals, but above them, crossing out all figures and repeating the entire numbers.

Copy in foreign languages should be marked accurately to show capitalization, punctuation, paragraphs, accents, or other peculiarities.

Wherever practicable, at least three corrected copies of a manuscript should be prepared, one of which should always be retained in the originating bureau. The original and a carbon copy should always be submitted to the Division of Publications. Reference of the manuscript to the different bureaus for examination will be thus facilitated, and final publication expedited. The submission of the manuscript in duplicate will also be a safeguard against possible loss.

## LIBRARY RULES.

The rules of the department library are in preparation and will be printed in the near future. In the meantime, attention is called to some of the most important regulations:

No book or periodical may be taken from the library unless a record is left with the assistant in charge.

All books, when no longer needed, should be returned to the library.

All books charged to individuals should be returned to the library before leaving on vacation. Under no circumstances should books be kept in locked desks or where they are not available for immediate recall when needed by others.

No book charged to an individual should be lent to any other person without notifying the library, so that the proper record may be made.



**IMPORTANT RULINGS.**

(Contribution from Advisory Committee on Finance and Business Methods.)

The Fiscal Regulations require that employees of the department traveling on official business, who avail themselves of sleeping car and parlor car accommodations and pay cash therefor, shall submit berth or seat checks as subvouchers in their reimbursement accounts. Attention has been called by one of the bureaus to the fact that several railroad companies operate their own sleeping and parlor cars instead of Pullman equipment and furnish no berth or seat checks, and the question was asked as to whether a statement to the effect that no such checks were furnished would be accepted in lieu of the subvoucher. The department has ascertained that practically all transportation companies operating sleeping cars and parlor cars voluntarily furnish passengers with berth or seat checks, and those who do not will furnish a cash receipt upon request. It is therefore necessary, in all cases where cash payments are made for accommodations of this character, that berth and seat checks, or cash receipts, should accompany the reimbursement account. The use of transportation requests in paying for railroad tickets will obviate entirely the necessity for furnishing subvouchers.

**Memorandum No. 136.**

**PURCHASE, MAINTENANCE, REPAIR, AND OPERATION OF MOTOR-PROPELLED OR HORSE-DRAWN PASSENGER-CARRYING VEHICLES.**

Under the terms of the Agricultural appropriation act for the fiscal year 1916 (Public No. 293, 63d Congress), and of section 5 of the legislative, executive, and judicial appropriation act for the fiscal year 1915 (38 Stat., 454, 508), the maximum amount which the department may expend out of its several lump-sum appropriations during the fiscal year 1916, for the *purchase, maintenance, repair, and operation of motor-propelled and horse-drawn passenger-carrying vehicles*, is limited to \$55,000. Of this sum not more than \$5,000 may be used for the *purchase* of such vehicles and boats. The department is also required to include in the estimates for the fiscal year 1916 and subsequent fiscal years amounts to be used for expenditures of the kinds described, and to report to Congress on the first day of each regular session the amounts of such expenditures during the preceding fiscal year.

The chief of each bureau is accordingly directed (1) to submit to the office of the Secretary on or before May 15, 1915, estimates of the amounts required to be expended during the fiscal year 1916 (a) for the purchase of motor-propelled or horse-drawn passenger-carrying vehicles and (b) for the maintenance, repair, and operation of such vehicles; and (2) to include in the statement

of expenditures, required by paragraph 133 of the Administrative Regulations to be forwarded to the office of the Secretary as soon as possible after September 1, 1915, and in the estimates of appropriations for the fiscal year 1917, required by paragraph 149 of the Administrative Regulations to be submitted to the office of the Secretary not later than September 20, 1915, respectively, statements of the amounts expended and estimated for the purchase, maintenance, repair, and operation of motor-propelled and horse-drawn passenger-carrying vehicles.

Each bureau will be notified before June 30, 1915, of the sum which it may expend during the fiscal year 1916 for each of the purposes indicated, and no bureau will incur expenses for such purposes in excess of the amount allotted to it. Statements of expenditures and liabilities incurred during the fiscal year 1916 against such allotments and the unencumbered balances thereof will be transmitted by each bureau to the office of the Secretary as soon after the close of each month as is practicable.

In preparing the statements required by this memorandum, information will be furnished only with respect to "passenger-carrying vehicles," that is, vehicles used primarily for the transportation of persons. Information with respect to vehicles used primarily for the transportation of commodities, such as drays or trucks, or with respect to saddle horses, should not be included.

Statements of expenditures or of estimates for the "maintenance, repair, and operation" of vehicles should include all expenses necessary for the use of the vehicles, such as, in the case of horse-drawn vehicles, expenditures for horses, harness, repairs to harness, forage, shoeing of horses, and the like, and, in the case of motor-propelled vehicles, tires, gasoline, carbide, lubricating oil, repairs, new parts, and the like. Expenses for the hire of either motor-propelled or horse-drawn vehicles by the month or year or continuously by the trip should also be included. Expenses authorized by sections (a), (e), and (j) of paragraph 78 of the Fiscal Regulations should not be included.

Employees traveling on official business in general will use means of public conveyance, but when traveling to points not readily accessible by railway, steamboat, or other means of conveyance employees may be authorized to hire special conveyance in accordance with section (j) of paragraph 78 of the Fiscal Regulations or to use their own vehicles. When permitted to use their own vehicles letters of authorization should be drawn so as to provide for reimbursement of the employees only at such rates per mile for the use of motor-propelled vehicles or at such rates per day for horse-drawn vehicles as will not exceed the actual cost of operating the vehicles.

CARL VROOMAN,  
*Acting Secretary.*

May 1, 1915.

**Memorandum No. 116. (Revised.)**

**COLLEGE DEGREE REQUIREMENTS OF APPLICANTS FOR SCIENTIFIC OR TECHNICAL POSITIONS.**

Hereafter no bureau, division, or office in the department shall establish a college degree as an unqualified prerequisite for admission to a competitive examination for any position in the classified service of the department, except in cases in which the position to be filled, like that of veterinary inspector, is of such scientific or technical character that both the chief concerned and the Assistant Secretary consider a college degree as an essential prerequisite. In all other cases in which a college degree is required, an alternative requirement of experience in line with the work of the position to be filled shall be made. The bureaus, divisions, and offices of the department will observe this rule in the preparation of tentative subjects, weights, and prerequisites for submission to the Civil Service Commission in connection with the establishment of new registers.

CARL VROOMAN,  
*Acting Secretary.*

FEBRUARY 2, 1915.

**Memorandum No. 140.**

**ORGANIZATION OF STATES RELATIONS SERVICE.**

In accordance with the provisions of the act of Congress of March 4, 1915, making appropriations for the Department of Agriculture, I hereby establish a States Relations Service in this department, which shall represent the Secretary of Agriculture in his relations with the State agricultural colleges and experiment stations under the acts of Congress of July 2, 1862, August 30, 1890, March 2, 1887, March 16, 1906, May 8, 1914, and acts supplementary thereto, and in carrying out the provisions of acts of Congress making appropriations to this department for farmers' cooperative demonstration work, investigations relating to agricultural schools, farmers' institutes, the relative utility and economy of agricultural products used for food, clothing, and other uses in the home, and the maintenance of agricultural experiment stations in Alaska, Hawaii, Porto Rico, and Guam, and in such other matters as the Secretary of Agriculture shall designate from time to time.

The States Relations Service shall include the following offices: (1) The office of the director of the service, which shall include those officers and employees engaged in the general work and administration of the service; (2) the Office of Experiment Stations, including the work of the service relating to agricultural experiment stations; (3) the Office of Extension Work in the South, including the farmers' cooperative

(Continued on page 18.)



## WORK AT BELTSVILLE FARM.

(Contribution from the Bureau of Animal Industry.)

The experimental farm of the Bureau of Animal Industry at Beltsville, Md., was purchased in 1910. It comprises 475 acres, of which all but 100 acres was tillable at the time of purchase. This farm had few improvements which could be used in the development of the experimental farm. There were no fences of any kind, and the soil was in a very low state of fertility. Shortly after the acquisition of the farm it was decided to divide the tillable land between the Animal Husbandry Division and the Dairy Division. When this division was made the Animal Husbandry Division received the east 190 acres together with the timberland, and the 190 acres of tillable land on the west was turned over to the Dairy Division. The two farms are administered by the divisions concerned. The farm has been fenced and a large portion of it drained. To add to the fertility of the soil, applications of lime and manure have been made, and crops have been grown to maintain the animals kept and also for the effect upon the soil.

### The Dairy Farm.

The principal crops grown on the dairy farm are corn, oats, crimson clover, and cow-peas, the idea being to grow sufficient rough feed for the maintenance of the dairy herd and the work stock. Until a part of the farm is sufficiently improved to grow grass, the dairy herd is being maintained on silage, grain, and a small quantity of hay.

Improved machinery of different kinds is used on this farm whenever practicable. There is a 30-horsepower tractor which plows an acre of land per hour, or rolls and disks two acres per hour. A motor truck is used to transport the milk to the Washington laboratories and to haul general farm supplies.

Most of the buildings are of the solid-wall concrete type, with asbestos shingles, making them fireproof from the outside. A dairy barn, an office and laboratory building, milk rooms, a dwelling house for the herdsman, and two silos, have been built of concrete. In addition to this a small frame dairy house for temporary use, and a large open shed 30 by 159 feet for housing the young stock and a part of the milking cows has been built. Other buildings to be constructed include a concrete lodging house for men employed on the farm, and a concrete horse barn.

The office and laboratory building is equipped with all appliances necessary for investigational work, including a 5-ton refrigerating machine, hot and cold water, gas, and steam. All buildings are lighted with electricity, and motors are the principal source of power.

The farm is fortunate in having an excellent water supply. The water for both parts comes from a well 325 feet deep, and is forced wherever needed by means of an automatically regulated pump and pressure tank.

A complete sewer system has been installed and no open closets are allowed on the farm. All excreta passes through septic tanks which empty into the farm drainage tiles. This system was installed to protect the health of the farm employees and to prevent the contamination of the milk supply by disease-producing organisms.

Three years ago 16 grade dairy cows and 1 pure-bred bull were purchased. Since then pure-bred Guernseys and Holsteins have been added, which, with the natural increase, have brought the total number of cattle of all ages to 80 head at the present time. This herd is kept primarily for experimental work, but the surplus milk is sent to the Dairy Research Laboratories in Washington for use in the experimental manufacture of butter, cheese, and ice cream. Some milk has also been furnished to the Hygienic Laboratory of the Public Health Service for experimental work in the feeding of infants.

Experiments with silage are conducted and consist in growing different crops under various conditions, the idea being to find out the adaptability of different crops for silage. Extensive investigations are under way to determine the nature and extent of the losses which take place in the silo. Efforts are being made to determine the relative merits of wood and concrete as silo-building materials to find out the best mixture to use in making concrete and to devise means to protect the concrete from the acids of the silage.

Such animals of the dairy herd as are required are used for experimental work in feeding. A number of experiments have been conducted in cooperation with the Bureau of Plant Industry and the Bureau of Chemistry. Among these are the feeding of desiccated potatoes, the feeding of cornstalk extract (a by-product in the manufacture of paper from cornstalks), and the feeding of fish meal. Experiments have been conducted to determine the influence of water in the ration upon the chemical composition of milk. All of this work has been done in cooperation with the Dairy Research Laboratories.

Cold and warm skimmed milk and sour and sweet skimmed milk supplied in various quantities have been compared for calf feeding.

The first cows purchased were of ordinary, mixed breeding, selected for use in an inbreeding experiment with a pure-bred dairy bull. The plan of the experiment is to breed the heifers of the first mating back to their sire, and the female offspring of this second mating back to the same bull as long

as the bull is fit for service, the idea being to find out whether a good herd can be built up from a poor one by the use of only one good bull, and also to find out the effects of inbreeding, and to determine how far this may be carried on without degeneration.

Experiments in the care of dairy cattle include a comparison of the open-shed type of barn with the ordinary closed type, a comparison of different kinds of stable floors, and an experiment to determine the influence of the different factors on the bacterial count of milk. For this work a specially constructed barn has been built to accommodate four cows. The stable, cows, and lot are allowed to become very insanitary, then by gradually cleaning up, the influence of each factor upon the number of bacteria in the milk is determined.

In the near future work will be begun by physiologists regarding the secretion of milk, the object being to determine what it is that causes one cow to give more milk than another.

Very little is known of the relation of the mammary gland to other organs of the body, or of the conditions which determine the quantity of milk produced or its quality. Two cows with identical breeding and feeding may produce markedly different quantities of milk. The explanation of this is not clear. The object of this investigation is to obtain information which will permit a more logical breeding and feeding of dairy cows.

### Animal Husbandry Farm.

All of the buildings on the animal husbandry portion of the farm are different from those on the dairy farm, being of frame construction on a reinforced concrete foundation. The funds available for the construction of the necessary buildings did not permit of the erection of buildings of a more permanent nature on this farm.

The work in progress includes studies in the feeding of horse and mule colts; the feeding of hogs; the feeding and breeding of sheep and goats; the feeding and breeding of chickens, and laboratory studies in animal breeding.

The colt-feeding investigation has been in progress since the fall of 1912. Studies are being made of the growing of colts on rations in which the grain is respectively abundant or limited, the necessary feed in the latter case being supplied by the substitution of roughage, such as hay and silage. The farm also keeps a considerable number of grade and purebred Percheron mares and a purebred Percheron stallion.

The swine investigations are purely feeding experiments. The hogs maintained are practically purebred Berkshires and are good specimens for use in feeding studies. The use of forage crops, the study of cottonseed-meal poisoning, and various experiments in cooperation with other bureaus of the department are being carried on. In the



cottonseed-feeding work studies of the merits of copperas as an antidote for the poisoning have been made. It has been found that it is possible to remove somewhat the danger of poisoning by the use of copperas, the best results having been obtained when the copperas was dissolved and mixed with slop. Copperas, however, is not an absolute preventive.

Interesting experiments have been conducted with the Bureau of Plant Industry in the study of the feeding of desiccated sweet potatoes to hogs, and with the Bureau of Chemistry in the feeding of fish meal. The results of the latter experiment indicate that fish meal probably has exceptional value as a balance to corn in the pig's ration.

Plans are being made at present to put into effect a project for the study of the effect of forage crops on the quality of pork from hogs fed such crops. A building is being erected which can be used for slaughtering purposes and for curing meat. This work will be done in cooperation with the biochemic division of the bureau, which will make the chemical analyses necessary to bring the results of the experiment to a logical close. In view of the discrimination which appears to be made against hogs fed on certain forage crops and the great importance from an economic standpoint of such forage crops in the production of pork, these investigations are certain to have considerable value in the development of the swine industry, particularly in the South and in the irrigation regions.

In the sheep and goat work, studies in the breeding of sheep have been made for the production of fur and in cross-breeding investigations. Feeding experiments are now in progress for the study of the utilization of forage crops for sheep.

A large flock of goats is being maintained for the purpose of developing stock suitable for the economical production of milk. A number of years ago a flock of native goats was obtained from the South, and these have been selected carefully, those of the more pronounced dairy type being retained and mated to Saanen and Toggenburg bucks. The offspring of these matings has now reached the second cross. Many of these produce as much as 5 pounds of milk daily. It is expected that in the near future a study of the value of the milk for feeding invalids and infants will be carried on in cooperation with persons interested in this work.

The poultry work is carried on at the edge of the timber, the chickens having the range of wooded land, which varies from that which is sparsely wooded to that which is heavily wooded. From 1,200 to 1,800 chicks are hatched each year, and the breeds kept are those which are commonly regarded as the most valuable for the farm, and include Plymouth Rocks, White Wyandottes, Rhode

Island Reds, and Buff Orpingtons. There is also a flock of White Leghorns and Buff Leghorns. Studies are being made of the feeding of hens on various rations, including those in which the hen balances her own ration, rations in which fish meal forms a part, etc. Hens are being trap-nested and matings are being made to determine the possibility of inbreeding, and in certain instances to fix types desired in the flock. No birds are retained in the flock which have a disqualification that would bar them under the rules of the American Standard of Perfection. The results being obtained indicate that it is possible to combine utility and standard breeding to a practical degree. A Rhode Island Red male of good type and color proved to be especially prepotent with respect to producing daughters with an ability to lay well. Last year the daughters of this male were all good winter egg producers and averaged over 150 eggs for the year. This year all of his daughters proved to be good winter layers, and up to date are ahead of last year's hens in production.

The animal breeding investigations are carried on by means of guinea pigs. This work is confined almost entirely to a study of inbreeding, which has been in progress since 1906. Up to the present time as many as 15 generations of inbred pigs have been obtained, each mating being full brother and sister in every case. These investigations will be continued as far as possible with the stock in hand.

#### ENTOMOLOGICAL INDEX.

It is not generally known that the editorial section of the Bureau of Entomology, in Room 3 of the Entomology Building, maintains an up-to-date index to the illustrations that are included in publications on entomology of the Department of Agriculture, including those of the U. S. Entomological Commission, the late Division of Entomology, the Bureau of Entomology, and all papers, circulars, bulletins, and reports originating in this bureau and published in any of the general series of the department, including the Yearbook and the Journal of Agricultural Research. This index is available to the personnel of the Department of Agriculture for consultation at any time.

A general index of entomological publications having their inception in the above offices is in the course of preparation, and that part of it which pertains to the entomological bulletins of the departmental series is now available for consultation, it being complete for all the entomological bulletins of this series thus far issued.

#### ARLINGTON FARM.

(Contribution from the Bureau of Plant Industry.)

A portion of the Arlington estate, comprising some 400 acres, came under the control of the Secretary of Agriculture in 1900 and has since been known as the Arlington Experiment Farm. As soon as it came under the control of the Secretary of Agriculture steps were taken to clear, drain, and improve the area by the laying out of roads, the amelioration of the soil, and the erection of suitable buildings to make it a field laboratory for the several bureaus and offices of the Department of Agriculture.

This tract of land lies immediately east of Arlington Cemetery and occupies practically all of the area between the cemetery and the Potomac River. It may be reached from Washington by electric cars on the Rosslyn branch of the Washington and Virginia electric line or by drive over the new Government road from the Highway Bridge or the road from the Aqueduct Bridge along what is known as Mount Vernon Avenue.

At the present time the farm, as a result of the improvement of the soil and the development of its laboratory facilities, provides accommodation for some one or more lines of work in connection with each bureau of the department. The character of the facilities offered naturally renders the work largely, though not entirely, applicable to plant industry.

Without cataloguing the activities carried on at the place or making an inventory of the plantings it may be well to call attention to the fact that there is upon the place a variety collection consisting of 600 varieties of apples; some 200 peaches; a small collection of plums and cherries; an interesting and enlarging collection of roses contributed largely by members of the American Rose Society, a small collection of peonies, German iris and Japanese iris. Among the small fruits which are represented at the place is a collection of strawberries which are beginning to ripen, and arrangements are being made to have varietal descriptions, paintings, and colored photographs made of all of those which are true to name. Besides the varietal orchards there are orchards which have been planted expressly to provide for the testing of various insecticides and fungicides by the Federal Insecticide and Fungicide Board.

The office of cereal investigations conducts a portion of its field work at the Arlington Farm. At the present time (end of May) the barleys are beginning to ripen and the winter oats and wheat are heading. The forage crop work, which annually occupies from 12 to 15 acres, is being prepared for.



The planting of the variety collections and trials of such crops which are to be made this year will soon be under way.

Another interesting feature which occupies a portion of the farm is the drug garden. This affords opportunity for working out methods of culture of some of the plants from which our drug supplies are derived.

As soon as any area of the farm is released from actual occupancy by experimental work this area is planted to a soil-improving crop. The area occupied by orchards, forage crops, and cereals which do not require the use of the land during the winter is sown to a crop to be turned under the following spring. One of the best combinations for this purpose has been rye and vetch.

#### ACTIVITIES IN GREENHOUSES.

The erection of a range of greenhouses for experimental work was begun as soon as the farm was occupied by the department. This range has gradually grown to consist of ten greenhouses, each comprising two compartments 20 by 50 feet, so piped and planned as to provide comparable units for experimental use. Besides this there have been recently erected for the accommodation of work on soil fertility two greenhouses of special design.

In the greenhouses at the present time (end of May) one may see a crop of cauliflower seed approaching maturity. This has been an interesting problem for seed growers, as little or no cauliflower seed is produced in America. The working out of a plan of producing the seed even under glass marks an important achievement in the production of a home supply of seed of this kind. In another unit of the greenhouse a crop of tomatoes is approaching maturity, and in still another unit there is a crop of lettuce seed of a special selection which is maturing. Other areas have been devoted to the production of roses, to the testing of the crops adapted to the different combinations of organic soils, and to the production of carnations, particularly for the study of the possibilities of producing certain forms and color values in the carnation.

The area occupied by the buildings at the farm has been laid out in such a way as to provide roads leading to the various centers of activity and to the various plats. It has been so planted as to produce a pleasing effect and at the same time demonstrate the value of ornamental shrubs for beautifying the areas around farm buildings.

#### FIFTY ACRES ADDED TO FARM.

An important improvement of the farm has just been accomplished through the cooperation of the Engineer's Office of the War Department, namely, by depositing the dredgings from the Georgetown Channel of the Potomac River. In this way an area which has not heretofore been available for agricultural

purposes has been filled. The dredgings have raised this area above high tide and will make available, as soon as it is sufficiently dry, some 50 or more acres which heretofore have not been suitable for agricultural crops. It is fortunate that this additional area will be available, as the farm has for some time been fully occupied by the experimental work of the various bureaus.

Those who are not familiar with the development of the Arlington Farm will be interested in the systematic way in which it has been laid out in sections 8 rods wide and the rows so spaced that each represents one-hundredth of an acre. The buildings are also centrally located and the heating requirements of the several structures, including the greenhouses, are provided from a central heating plant. Each year has increasingly demonstrated the value of this field laboratory in connection with the various activities of the Department of Agriculture, and several of the lines of investigation which could not be cared for in any of the structures of the department in Washington are most satisfactorily provided for at Arlington Farm.

### REPORT FOOD FRAUDS.

*(Contribution from the Bureau of Chemistry.)*

The field men of the department can render valuable assistance in the enforcement of the food and drugs act by giving information to the chiefs of inspection districts of the Bureau of Chemistry at Washington, Chicago, or San Francisco, or to any of the branch laboratories of the bureau, regarding apparent violations of the law that come to their attention. It will be well to keep in mind that the Federal food and drugs act applies only to foods and drugs which enter interstate commerce—that is, which are shipped from one State or Territory to another State or Territory, or which are manufactured or sold within the District of Columbia or the Territories, or shipped from or to a foreign country—and that it does not apply to foods and drugs which are produced and consumed within the same State. Foods and drugs which do not enter interstate commerce are subject to State laws and not to the Federal food and drugs act.

When calling attention to an apparent violation of the law as much information about the particular product referred to should be given as is at hand. Action will be facilitated if there can be furnished with the complaint a copy of the label, the name and address of the manufacturer, the name and address of the dealer or other person who sold or who has possession of the particular lot of goods, and a statement regarding the particular in which it is believed the product is adulterated or misbranded. It is also useful to know approximately how

much of the product the dealer from whom it was purchased has on hand, and at what price it sells. While all this information will be useful and will facilitate action, it is not absolutely necessary that it be furnished, and all apparent violations should be reported, however little information may be available. It is probable that the bureau can secure all the necessary facts. It is merely suggested that this additional information be supplied when the man who is calling attention to the case has it at hand. It is essential that sufficient information be furnished to enable the bureau to identify certainly the particular manufacturer's product of which complaint is made.

When it can be done without inconvenience a small bottle or package of the product might be submitted. The bottle or package should preferably be one of the original packages in which the product customarily is sold, having the label attached. The way in which a package is labeled is a very important point in determining whether there has been a violation of the law. A sample collected by anyone other than an authorized inspector can seldom be used as a basis of a case under the law, for it is necessary to have the sample sealed and identified with certain shipping records and invoices, which usually can be obtained only by some one who is familiar with the procedure and knows exactly what records are necessary to prove interstate shipment. The sample, however, serves the purpose of enabling the bureau to determine by analysis or other examination whether the product is in violation of the law. If it is, the inspectors then can be instructed to collect an official sample, with the necessary records, in order that a prosecution against the person responsible for the violation may be instituted. The person calling attention to the apparent violation will not be asked to serve as a witness, nor will his name be used in any way in connection with the case.

The Bureau of Chemistry can not analyze samples of foods and drugs for the information of individuals, nor in any case give out information regarding the results of analyses or findings of the bureau until after a case has been tried in court, when the essential facts are published in the form of a notice of judgment. The bureau frequently receives samples accompanied by a request that the sender of the sample be informed as to whether or not the product complies with the law, or is of standard quality. The bureau, in accordance with the policy of the department, declines to make analyses of samples sent in for that purpose. However, when samples are sent in with a complaint that the product is in violation of the law, the bureau will examine the samples to determine whether or not the product is adulterated or misbranded in order that



appropriate action may be taken, if action is deemed necessary.

Apparent violations may be reported to the chiefs of inspection districts at the Department of Agriculture in Washington, or in the Appraiser's Stores Building, San Francisco, or Transportation Building, Chicago, or to the chemists in charge of any of the branch food and drug inspection laboratories located in Appraiser's Stores, New York City; Broad Exchange Building, Boston; United States Appraiser's Storerooms, Philadelphia; Federal Building, Buffalo; United States Customhouse, Savannah; Customhouse, San Juan, P. R.; Old Capitol, St. Paul; Old Customhouse, St. Louis; Government Building, Cincinnati; United States Customhouse, New Orleans; Arcade Annex, Seattle; Tabor Opera House Building, Denver; and Board of Health Building, Honolulu, Hawaii.

## WEATHER BUREAU COOPERATION.

*(Contribution from the Weather Bureau.)*

A large proportion of the energies of the Weather Bureau, and by far the greater part of its annual appropriations, are expended in a practical, day-by-day service to the public.

While this is true, there are many lines of cooperation which it now carries on with other branches of the department with mutual benefit.

In the great irrigation projects of the semi-arid regions of the West, the rainfall and snowfall records kept by the Weather Bureau have been of much value to the engineers in charge of these irrigation schemes. This is especially true of the records kept by the Weather Bureau of snowfall in the higher adjacent mountains, from which come the storage waters with the melting of the snow in the spring and summer months.

The Bureau of Soils, in its numerous bulletins, supplements its studies and investigations by the publication of climatological records of the various soil areas. These records are obtained from the Weather Bureau and add appreciably to the value of the facts collected and conclusions reached in the soil-survey work.

The cooperation between the Weather Bureau and the Bureau of Crop Estimates is unusually close on account of the related nature of the work in which each is engaged, although the information collected and the publications issued are by no means identical in character, the Weather Bureau having in view a concise history from week to week during the crop-growing season of the weather conditions prevailing throughout the entire country. The relations existing between the weather and crop growth are

so obvious that the reciprocal benefits derived from an interchange of data between the two bureaus require no special explanation.

Within recent years there have been developed several lines of cooperation between the Weather Bureau and the Forest Service. One of these, the issue of "fire wind" forecasts during periods of drought, has proved of no small value to the forest supervisors and rangers, by putting them on their guard at such times and leading them to the adoption of extra precautionary measures to prevent the inception and spreading of forest fires. Another feature of cooperation between the Weather Bureau and the Forest Service is the series of observations carried on at Wagon Wheel Gap, Colo., by these two branches of the department, the object being to arrive at a better understanding of the relation between forests and stream flow. Owing to the nature of the problem, this study will necessarily extend over a number of years.

In addition to its several hundred fully equipped stations in the field, the Weather Bureau has cooperative and other special stations in practically every county in each State of the Union, the total number being not far from 4,000. These smaller stations are in charge of intelligent, public-spirited citizens, who for the most part give their services without any recompense other than the free receipt of the bureau's publications. On numerous occasions the services of the observers at these stations have been utilized in collecting information for other bureaus. Their daily records of weather, temperature, and other meteorological phenomena also serve to establish the climatic history of the particular locality and are frequently consulted by bureaus of the Government, as well as by railroad companies, civil engineers, physicians, real-estate agents, and business men generally. Not a few of the cooperative observers amplify their regular temperature and rainfall records by extended notes regarding the time of planting and harvesting of crops and the leafing and blooming of forest trees, shrubbery, and flowers, thus maintaining a record that on various occasions has been serviceable to the Bureau of Plant Industry in its investigations.

In its upper-air explorations the Weather Bureau has cooperated with the War Department more or less extensively for several years, the latter having placed at the disposal of the Weather Bureau its hydrogen gas plant for use in inflating the balloons that are sent up to high elevations, carrying with them delicate self-recording meteorological instruments. Advantage has also been taken of the opportunity afforded by the Coast Guard Service for utilizing one of its patrol vessels in conducting kite flights and general meteorological observations off the North Atlantic coast.

The records of the bureau have long been used by the Public Health Service in connection with its mortality records, the conditions of humidity, heat, cold, drought, etc., being intimately associated with a tendency toward the prevalence of certain kinds of diseases.

The distribution of weather forecasts and storm warnings over the surrounding water areas and the collection of reports from vessels at sea are made possible through the hearty cooperation existing between the Weather Bureau and the Radio Service of the Navy Department. This service is also maintained on the Great Lakes.

Cooperation on the part of the Weather Bureau with State experiment stations and State agricultural colleges has frequently been productive of much good. Such combined activities are now in progress in Ohio, where important crop studies are being made, and in the mountainous regions of North Carolina, where an elaborate system of temperature and humidity observations are in progress with a view of determining the elevation at which fruit can be most successfully raised.

The foregoing represents the larger lines of cooperation carried on between the Weather Bureau and other bureaus and institutions. Its relation to the general public and the numerous ways in which it serves particular industries are so varied that it would be impossible to go into a discussion of them in a short article. A small pamphlet, "The Weather Bureau," contains an interesting account of these special applications of Weather Bureau data and discloses their utilization in nearly every calling in which the weather plays a part.

Should this brief enumeration of the cooperative features of the Weather Bureau's work suggest to other branches of the Government service an opportunity for their further extension, the bureau will gladly place its working force and records at their disposal as far as practicable.

Water is a national forest resource of even greater importance than timber or range, for the forests feed every important western stream. Water supplies and the value of water use depend to a large extent on the methods employed in handling the timber and forage resources, for both the volume and the purity of the water yield may be disastrously impaired by bad forestry or grazing methods. Of all forms of water use, that which supplies municipal needs should be given most careful consideration. Some 1,200 western towns derive their water from national forest watersheds. The authority of the Secretary of Agriculture to protect such water from contamination is inadequate to safeguard the public health and should be enlarged by further legislation.—[Annual Report, 1914.]



## FIELD MEN AND ROADS.

*(Contribution from the Office of Public Roads and Rural Engineering.)*

Field representatives of the Department of Agriculture are asked occasionally: "What can you do to help us get a good road here? We need one, but do not know how to get it." In other instances, the field agents of the department may have felt impelled to ask the people, in turn: "Why haven't you a better road system?" In either event, it would be a decided impetus to the good-roads movement if the department representative knew enough about the activities of the Road Office to be able to tell the local inhabitants just how much help they might expect in solving their road problems.

In communities where it is quite evident that the population is ignorant as to the simplest benefits derived from good roads, an educational campaign is needed to arouse a spirit of progress in the communities. One of the most effective methods for conducting this educational work is by means of lectures. If any community desiring a roads lecturer can assure the office that the lectures will be attended by representative audiences large enough to repay the office in practical results for its effort and expense, it has only to make request, and the lecturer is sent without expense to the community. Not only are these lectures designed to waken a deep interest in road betterment, but also to point out ways and means for obtaining the needed improvements. Consequently the lectures are only given where such a purpose can be served. When a number of neighboring communities can each make arrangements for a meeting this is desirable, inasmuch as it makes the trip more worth while to both the public and the office by increasing the number of lectures given with very little increase in the traveling expenses.

Wherever practicable, the lecturer carries with him a set of colored lantern slides, suitable for illustrating the particular conditions and needs of the locality. Needless to say the pictures have frequently been of greater power, especially in the very bad road sections, than any number of wordy exhortations. When it is not possible or necessary for the office to send a lecturer, it loans a set of suitable lantern slides to some responsible local representative or association, free of expense save for express charges. The office requires that the slides loaned be made of active and practical use in the community and that they be returned in good condition within 90 days. It has also furnished a brief synopsis of a lecture which can be used to accompany the showing of the slides, when the person making the loan has requested such aid.

## PUBLICATIONS.

The publications of the office are sent free upon request to all who send in their address with the statement as to just what phase of road work they wish to study. The publications cover almost every side of the question, and the larger part of them have been written, not primarily for the use of the engineer, but rather for the instruction of the people untrained in engineering. Numbers of county road officials have requested certain of the publications sent to each of their township or district road men who probably have had no previous opportunity to study the best road methods.

## EXHIBITS OF ROAD MODELS.

Perhaps the educational work done by the office that is at once most instructive and most enjoyed is in connection with its road models and enlarged photographs which are sent to State fairs, expositions, conventions, and association meetings throughout the country upon request of the proper officers who agree to pay the shipping and installing costs. Among the models are miniature roads, bridges, and culverts, each representing the best method for constructing its particular type. Any one desiring to know more about the models can do so by writing for a copy of Department Bulletin No. 220.

## OBJECT-LESSON ROADS.

In the line of actual construction work, the office may be called upon for assistance in several distinct forms, which it has classified as: Object-lesson roads, experimental road work, bridge work, county model systems, special advice and inspection, superintendence of county roads, road surveys, investigation of road materials, and road maintenance. It may be that a department field man can diagnose the road trouble of a community as needing one of the above-mentioned forms of assistance. To secure this aid, it is necessary always for the proper local road authorities to secure a blank form from the Office of Public Roads, upon which to make request for such assistance. When the blank is returned properly signed, it is noted and handled as soon as possible after receipt. Very often, however, the number of requests are so many that they must take their turn. It should be mentioned that the office is not authorized to aid corporate villages or cities.

The object-lesson roads are intended to be exactly what their name denotes, and are of the type best suited to the community calling for them, and are built under the supervision of an engineer sent out by the office. The engineer remains on one piece of object-lesson road work only long enough to instruct the local road men as to the best method of building such a road, and to leave, in the

section which he does complete, a practical demonstration before the community of what they may expect from work correctly done. The community, of course, furnishes labor and material in the construction of all roads, receiving from the office only the engineering advice and superintendence. The office inspects these roads from time to time, to see how they are kept up by the local authorities, and to learn whether they have rendered service of actual value to the community at large.

## BRIDGE WORK.

Since frequently the most important work on some roads consists in the method of crossing an intersecting stream, the office has given assistance to local officials in the preparation of bridge designs, taking especial care in designing them to suit the conditions. Typical designs for bridges have also been prepared in the office for general conditions, and copies are furnished upon request. Whenever practicable, the office has furnished, if requested, an engineer to inspect a bridge site for a community, and in some cases designs prepared by bridge companies have been reviewed for the benefit of local officials.

## EXPERIMENTAL ROADS.

Occasionally a community plans to build a road of more or less experimental nature, perhaps with a distinct object in view, such as securing a dustless road. This may be difficult, particularly if the materials available are not of the best. The office of Public Roads has cooperated in a number of such instances, upon the request of the local authorities, bringing into use not only its engineering knowledge, but its knowledge of the use of chemical dust layers.

## SPECIAL ADVICE AND INSPECTION.

The office receives a large number of requests each year for assistance in solving isolated problems which have proved too much for the local officials and which may be peculiar only to the respective localities. As a rule this work does not involve supervision of actual construction work, but includes short assignments of an advisory nature, such as the location of a road, selection of the type best adapted to the people's needs, and so on, until it may be advisable for the county or other road district to apply to the office for the assignment of an engineer to act as a consulting expert.

## COUNTY MODEL SYSTEM WORK.

This work, as carried out by the engineers of the office, has been especially valuable for those road districts which are about to spend a large sum of money on their roads, through bonds or otherwise. They wish to



make sure they shall secure the greatest value possible, and, with an office engineer in charge, they secure a thorough report on existing conditions, with recommendations for improvement. The engineer must prepare a map of the district, study it to learn where are the best available road materials, if any, and determine which roads through the district are most important, and therefore to be improved first. He must then provide for the location of each road so as to secure the best possible drainage and grade. In short, when the engineer's report is completed the county road officials have a practically exhaustive study of their road question, from map to construction and maintenance costs, and from the best method of handling bond-issue funds to the report of tests on road gravel found in some remote corner of the district.

#### SUPERINTENDING OF COUNTY ROADS.

A recent line of work which has proved very satisfactory and productive of good results has been the assignment of an engineer to superintend the county road work in certain counties for a specified length of time. The entire system of roads is inspected regularly, and recommendations for improvements in methods not only of road construction, but of road management, are made to county, township, and even to State authorities. Where the county authorities have started construction work, the office representative is in direct charge of the improvements, and it is his duty to secure such important improvements as reduction in grades, elimination of dangerous curves, and greater safety at railroad crossings, all advisable use of local road materials, and a permanent drainage system.

#### ROAD SURVEYS.

In communities needing surveys the office is glad to render assistance by assigning an engineer for the work when requested to do so by the road authorities of a community.

#### ROAD MATERIALS.

One service easily rendered the people of any community by a department representative is to inform them that the Office of Public Roads tests, free of charge, any material which road builders may wish to use in their work. The office will furnish instruction as to selection and shipment of samples, upon application of any individual. The testing laboratories of the office are equipped with machines which show, in a fairly practical way, how a rock may be expected to wear when in actual service upon a road, an important fact to know, when a contractor may otherwise throw the people's money away on a road whose stone rapidly crumbles under traffic. Tests can also be secured on cement,

concrete, and on dust layers, such as road oils and tars.

#### ROAD MAINTENANCE.

On account of the great increase of bond issues for road construction since 1910, and the general failure of local officials to make proper provision for maintenance, there has been a corresponding increase in the demand upon this office for advice and assistance in preserving the roads that have been improved. The office is, therefore, making a careful study of the best systems of maintenance and road patrol work for both county and State, both with regard to work itself and to the cost per mile per year for upkeep of different classes of roads. The result has been requests from a number of organizations and counties that the office take up the maintenance of their roads, so as to demonstrate to the people of the community the ultimate necessity of saving their road money by preserving the improved roads, once they are obtained. The demonstration work so far done along this line has been accompanied by an unexpected degree of success.

It is to be hoped that the field representatives of the department, in discussing the various office methods of assistance, as outlined above, will make clear to local authorities that the office can not furnish financial aid in any way, but is only empowered by Congress to furnish advisory aid through its engineers, chemists, and economists.

**Solar radiation investigations.**—The Weather Bureau has apparatus for measuring the intensity of the direct solar rays at Washington, D. C.; Madison, Wis.; Lincoln, Nebr.; and Santa Fe, N. Mex. The measurements are made only on days when there are no clouds to obscure the sun. At Washington and Madison continuous records are obtained of the total amount of heat received from both the sun and sky, and it is expected that apparatus for obtaining similar records will be installed at Lincoln by July 1. The Monthly Weather Review for March, 1915, will contain a chart showing the average amount of radiation received at Washington during each hour of the day throughout the year.

During March and April the apparatus at the three stations outside of Washington was inspected by the official in charge of these investigations.

During May measurements of the intensity of direct solar radiation, and also of the rate at which heat is radiated to the sky at night will be made in the mountain regions of southwestern North Carolina. These observations are desired in connection with a study that is being made of the occurrence of frosts in orchards of that region.

## CEREAL DUST EXPLOSIONS.

The results of an investigation into the causes of 19 cereal dust explosions were stated by David J. Price, of the Bureau of Chemistry, in an address before the Convention of the Fraternity of Operative Millers of America, at Cincinnati, on May 26, 1915. Mr. Price spoke from an engineering standpoint, the chemical experimental work in connection with this subject being in charge of H. H. Brown, in Buffalo. The investigation of cereal dust explosions is being conducted cooperatively by the Bureau of Chemistry and the Office of Public Roads and Rural Engineering of this department, the Bureau of Mines of the Department of the Interior, and Pennsylvania State College.

The explosions, which formed the text of the address, have occurred since 1905 in cereal, flour and feed mills, in grain elevators, and in starch and glucose factories. As a result of these explosions, at least 80 men have been killed and 125 injured. The property loss has exceeded \$2,000,000.

The causes of the explosions were stated to be as follows:

Cereal mills: 5, sparks from grinding machine; 1, unknown.

Flour mills: 3, unknown; 1, sparks from grinding machine.

Grain elevators: 3, unknown.

Starch factories: 2, unknown; 1, static electricity.

Feed mills: 1, sparks from grinding machine; 1, unknown.

Glucose factory: 1, sparks from grinding machine.

From this it appears that 8 explosions seem to have originated from the sparks produced in the machines during the grinding process; that 1 was attributed to static electricity; and that the origin of the other 10 is unknown, although in a number of these cases plausible theories have been advanced as explanations.

Any particle of gravel, flint, or metallic substance that comes into contact with the plates of the grinding machine may produce sufficient sparks to ignite dust on the interior of the machine. Of the 8 explosions caused in this way, 5 occurred during the grinding of oat hulls, 1 with feed, 1 with gluten, and 1 with wheat screenings.

#### EXPERIMENTAL MILL.

In order to determine definitely, if possible, the relation between a suspended dust cloud and sparks produced in a manner similar to these instances, an experimental mill has been erected at Pennsylvania State College and the necessary experiments have been planned by the experimental staff of the college and the Department of Agriculture. These experiments will be begun at an early date.



Of 3 accidents in grain elevators which were investigated, 1 occurred in the East, 1 in the Middle West, and 1 in the South. The explosion in the East killed 15 employees, and 2 women who were walking outside of the plant were so badly burned that they died of their injuries. The property itself was wrecked to such an extent that the cause was never definitely ascertained. For the explosion in the Middle West two theories have been advanced. This explosion occurred in an elevator leg used for taking grain from one bin and transferring it to another. After the explosion an odor resembling that following the discharge of a shotgun was noticed on the first floor and on the top of the elevator where the flames escaped. It was suggested, therefore, that a loaded cartridge had become mixed with the grain in shipment and had been exploded by friction in handling. At the time of the explosion, however, one of the men was using an extension light cord, with an incandescent light attached, to look into the leg through an opening on the first floor. Later it was found that the extension cord had been burned out. This suggested the possibility that an electric spark had ignited the elevator dust.

#### CAUSES SUGGESTED.

From these and similar investigations here and abroad, the paper stated that the following causes may be advanced for cereal dust explosions:

1. Introduction of foreign materials into grinding machines.
2. Use of open lights or naked flames such as oil lamps, torches, gas jets, lanterns, candles, matches, etc.
3. Property fires.
4. Electric sparks from motors, fuses, switches, lighting systems.
5. Static electricity produced by friction of pulleys and belts, machinery parts, grinding machines, revolving reels, etc.

The last cause, static electricity, opens up an interesting field of discussion. On a dry frosty morning in September, 1913, two slight explosions occurred in separate plants in western New York at a time when no grain had entered the machines for a considerable period. This first suggested the possibility of static electricity by the operation of the revolving plates, and experiments showed that the friction of a very small pulley and belt would produce sufficient static electricity to ignite natural gas. At the same time it was learned that one company which had experienced a series of explosions had grounded the grinding machines by a wire connected to a rod driven in the ground near by and after this had experienced no further trouble. This appears to confirm the original theory.

Additional evidence was furnished by the explosion in the dextrin department of a starch factory in September, 1914. This explosion was traced to the production of

static electricity by friction of particles of dextrin on 80-mesh brass gauze surrounding a revolving reel which was moving at the rate of 16 revolutions per minute at the time of the explosion. The company had grounded this reel to an overhead sprinkling system, but the connection had been made from the journal box and a heavy film of fresh oil surrounded the shaft. It was thought that this film served to insulate the shaft and allow the "static" to accumulate until there was a sufficient charge to ignite the dextrin dust.

#### THRESHING MACHINE EXPLOSIONS.

The very large number—amounting to about 300—of explosions and fires in threshing machines in the Northwest last season, together with a number of similar accidents in Kansas, have been attributed to the same cause—the production of static electricity by the operation of the cylinder in the separating process. In these cases the occurrence seemed to originate at or near the cylinder and would flash through the entire machine instantly. In many cases the separators were destroyed before the fire which followed the original ignition was checked. Insurance companies refused to insure the machines, and anxiety was manifested regarding the future of wheat threshing in the Northwest. The losses due to these "smut dust" explosions were estimated at close to a million dollars. The Department of Agriculture is now planning to study this problem this summer in the Pacific Northwest.

The predominating factor which determines the inflammability of a dust and the action of a dust explosion has not been determined. A number of theories have been advanced, including the amount of volatile matter in the various dusts, together with the percentage of moisture and ash, the rate, or ease, of oxidation and the degree of fineness of the dust. All these have no doubt a marked relation to the action and nature of a dust explosion, and are at present receiving careful attention by the chemists experimenting along this line.

The early results obtained in this study thus far indicate that all dusts that are made in the handling and working up of grain into food products can be ignited under proper conditions, and also will propagate a flame, most of them with explosive violence. It must not be concluded from this statement that cereal dusts will ignite of themselves—that is, spontaneously—but when heated to their ignition temperature will ignite and will propagate a flame. In other words, there must be some outside source of heat. This source may be very small, as a heated coil of wire or an electric spark, as used in the experimental work with a high temperature, or it may be larger, as a flame, which may have a lower temperature but a larger heating surface.

#### AMOUNT OF DUST.

Various experiments have been made to determine the amount of dust necessary to propagate a flame. It has, for example,

been calculated that a sack of flour suspended as dust in 4,000 cubic feet of air (a room 20 by 20 by 10) would, when ignited, generate sufficient force to throw 2,500 tons 100 feet high. Explosions have also been produced at the Pittsburgh Testing Station of the Bureau of Mines with an amount of coal dust in suspension equivalent to 1 pound in 500 cubic feet of air. Preliminary experiments have shown that many cereal dusts have relatively a lower ignition temperature and produce higher pressures than the coal dusts, and we may conclude, therefore, that the explosive limits would be lower with cereal dusts.

#### PRECAUTIONS RECOMMENDED.

From the knowledge already available in regard to these dust explosions it is obvious that certain precautions should be taken in any plant in which cereal dust is likely to accumulate. Among these precautions are the following:

The use of gas jets for lighting purposes, the introduction of lanterns or open lights into grain bins or dust collecting systems, and similar practices, are very dangerous and should be at once discontinued by millers. The officials should take steps to enforce this rule rigidly and not allow the workmen to introduce an open flame of any kind into a dusty atmosphere.

Dust should not be allowed to accumulate but should be removed from all parts of the mill. A plant where dust is permitted to accumulate is always in danger of fires and explosions.

Electric bulbs in dusty atmospheres located near machinery where there is a possibility of the lamp becoming broken, or at points in the mill where workers may strike the lamp, especially when carrying a projection of some kind on their shoulders, should be inclosed in strong wire guards or protectors. It would be an extra safety precaution, whenever possible, to locate all fuses on light and power circuits, switches, starting boxes, motors, etc., at points where dust is not present.

Provision should be made for equipping grinding machines and pulleys and shafts with an effective ground connection for carrying away static electricity produced in this manner. Since this particular field is new, it may be advisable to arrange grounds of this nature at once, and remove this possible source of ignition.

The size of the bins receiving ground material has an important relation to the extent of the force or violence of the explosion. These bins should be of limited proportions and not give opportunity for the dust to be in suspension.

The practice of lowering lights into grain bins is a dangerous one and should be prohibited. Dangerous conditions may result if the lamp is broken on the side of the bin. The same result can no doubt be obtained by lowering a "tape" with a weight attached to the end, and the exact measurement recorded.



## FARM MANAGEMENT DEMONSTRATIONS.

(Contribution from the Bureau of Plant Industry.)

The farm management demonstrations now being carried on by the department with a number of the States bring out these facts:

(1) In most communities some of the farmers are much more successful than are their neighbors. As far as the work has gone in 19 Northern and Western States it has been found that out of any group of fifty to one hundred farmers there are always from ten to twenty that have labor incomes from their business from \$500 to \$2,000 greater than the average of the group.

(2) These more successful farms can not be picked out with any certainty by their fine appearance or by their good crops, by their fine live stock, or even by their large financial returns from any single enterprise.

(3) The only safe way to compare the efficiency of any given farmer with that of others in his community is to compare the labor incomes which they receive from their respective farms—a farmer's labor income is what he has left of his gross farm income after he has paid his farm expenses and has deducted a fair rate of interest on his farm investment.

(4) To have a good labor income a farmer should have reasonably good crops, ordinarily have some good live stock, have his farm business so organized that it will afford regular and profitable employment for his men, work stock, tools, and capital, and have a business big enough to make it worth his while to run it.

(5) In undertaking to reorganize his business so that it will produce a greater labor income, the farmer should know what each crop and kind of live stock is contributing toward it and what are the possibilities in this connection of other enterprises which may be introduced.

(6) Farm accounts kept throughout the year, especially of certain enterprises, are of value in summarizing the farm business and determining thereby the year's labor income, but most farmers have in mind or have jotted down on available memorandums enough information to enable the making of a reasonably accurate summary. Ordinarily the errors in such a summary are minor as compared with the variation from the normal of the season covered by the summary.

(7) It is very helpful to most farmers who wish to improve their farm business after having determined that their labor income is too small, to analyze their business into its component parts and compare it item by item with averages of the business conducted by their neighbors who are working under similar conditions.

(8) The determination of the labor income secured from any given farm is ordinarily a comparatively simple matter.

(9) It is likewise easy to analyze the business of a farm and to compare it in detail with others being run under similar conditions and to point out how it may be improved.

(10) When this work is properly presented to farmers at opportune times they become much interested and are glad to have the business of their farms summarized, analyzed, and compared, with the thought that thereby they may be able to reorganize their farms to make them produce greater labor incomes.

(11) County agricultural agents and teachers of agriculture in high schools when carefully instructed by a special farm management demonstrator soon become proficient in determining farm labor incomes and in analyzing and comparing the business of different farms.

(12) Such work as this is very beneficial to a county agent through giving him a better understanding of the agriculture of his county and the problems which his farmers must solve and through bringing him in personal touch with individuals in his county in a way that appeals to them very much.

(13) Farmers who are so inclined do not find it difficult to calculate their own labor incomes under the guidance of a county agent or other such local leader.

### TWO IOWA FARMS.

The following table gives the analysis and comparison of the business of two Iowa farms and compares them with averages of other farms located in the same neighborhood. In column III are shown the averages for 62 farms in the neighborhood. In column II, 13 of the better farms are averaged. Column I shows one of the more successful farms—that of Mr. A. Mr. B's farm, shown in column IV, is not so good as the average of the 62.

#### Comparison of some Iowa farms.

	I. Mr. A's farm.	II. Average 13 better farms.	III. Average 62 farms.	IV. Mr. B's farm.
Labor income.....	\$1,231	\$1,050	\$145	\$72
Size of business:				
Total acres.....	282	188	171	100
Crop acres.....	234	144	125	70
Animal units.....	18	24	21	12
Total receipts.....	\$3,393	\$3,211	\$2,430	\$1,597
Quality of business:				
Live stock returns on \$100 worth of feed.....	\$102	\$130	\$119	\$169
Crop yields—				
Corn, bushels...	50	43	38	40
Oats, bushels...	37	40	37	37
Hay, tons.....	1.3	1.6	1.6	1
Efficiency of labor—				
Crop acres per man.....	102	85	75	59
Crop acres per horse.....	37	22	18	12
Diversity of business, main sources of in- come:				
Corn.....	\$680	\$813	\$615	\$360
Oats.....	\$584	\$704	\$240	.....
Hogs.....	\$843	\$363	\$85	\$680
Cattle.....	\$556	\$536	\$359	\$355

From this table it will be noted that considering the importance of the corn crop in that section, Mr. B's crop yields were about as good as the average of the community shown in column III and that his live stock was very much better even than the live stock of the better farms averaged in column II. What, then, is the reason that his labor income is but half the average of the neighborhood and about a fifteenth the average of 13 of the more successful farms? His trouble is due almost entirely to having too small a business. His crop acres per horse in comparison with his neighbors shows that he could care for about twice as many acres of crops without any increase in his work stock; likewise his men are not working to good advantage. If he had a larger acreage he might increase his live stock operations, to which enterprise he seems so well adapted, or he might put in some cash crops; in fact, it would be wise for him to do both. The oat crop may not be so very profitable per acre in that section, but the way it is grown there it fits in with the corn crop fairly well and enables a farmer to use men and horses when otherwise they might not be engaged in any very productive labor. If Mr. B had some cash crops it would not go so hard with him in case he had bad luck with his feeding operations, such as an outbreak of hog cholera, which might wipe out a large part of his income from that source. If Mr. B can not secure more land he should dispose of some of his horses and save several hundred dollars' expense in feeding and caring for them.

#### USE OF RENTED LANDS.

Mr. A, whose farm is shown in column I, owned less acreage than did Mr. B, but he rented land enough to make his crop area double that of his neighbors and more than treble that of Mr. B. In spite of this fact he grew good crops, better than the average, almost as good as the best, and yet he had but little more work stock than did Mr. B. The larger area enabled him to grow more oats, almost double that of the more successful farmers. His income from this source alone was more than eight times Mr. B's entire labor income. His income from cash crops was almost as great as that from live stock—a very wise diversity to have, as evidenced by the 13 more successful farms shown in column II. In looking over these figures, however, it was evident to Mr. A that he should increase his income still further by better handling of feeding stock.

In this area there were 29 farms from which the labor incomes were smaller than the \$72 which Mr. B secured from his farm; in fact, most of them failed to pay 5 per cent interest on the investment. If weaknesses in the farm organization can be pointed out so readily to Mr. B, and even in a small way to Mr. A, it is evident that the operators of many of the 29 farms may receive material assistance when the farms are compared in a similar manner. Indeed, weaknesses may be pointed out in practically every farm in the area by means of such a comparison as the foregoing.—(*Farm Demonstration Monthly*, June, 1914.)



## SOUTHERN DEMONSTRATIONS.

(Contribution from the Bureau of Plant Industry.)

The Office of Farmers' Cooperative Demonstration Work in the South has completed the compilation of the crop record books of the local agents in corn, cotton, and oats. The work has been conducted by the Bureau of Plant Industry in cooperation with the agricultural college in each State and with States', counties', and local organizations. The tabulated reports show that in 1914 13,565 demonstrators on 110,408 acres of land grew 3,846,327 bushels of corn, an average, taking the demonstration farms over the South, of 34.83 bushels per acre. This is an increase of 14.1 bushels over the average yield for the Southern States, as estimated by the Bureau of Crop Estimates.

It is interesting to note that for the five years during which exact records have been kept of corn yields this has been about the percentage of increase secured on demonstration farms over the average yield, though in some years it has run considerably higher. The exact figures are:

	1910	1911	1912	1913	1914
Average yields <sup>1</sup> under demonstration methods.....	35.3	33.2	35.4	35.9	34.8
Estimate <sup>1</sup> of the Bureau of Crop Estimates.....	19.3	15.8	19.6	20.2	20.7

<sup>1</sup> Bushels per acre.

The tabulations for 9,392 cotton demonstrators show that they produced a total of 135,272,728 pounds of seed cotton on 129,475 acres of land, an average of 1,044.77 pounds per acre. The average yield per acre in all the South, according to the Bureau of Crop Estimates, was 623.7 pounds per acre, showing an average increase in yield on demonstration farms of 421 pounds of seed cotton per acre.

Reports from 916 oat demonstration farms show that on 11,798 acres of land there was produced 508,039 bushels, an average of slightly over 43 bushels per acre. Although the office has been conducting oat demonstrations for several years, this was the first year that it has undertaken to keep exact records of demonstration yields. The average yield per acre of oats in the South, according to the Bureau of Crop Estimates, was 22.2 bushels per acre. Therefore, the increased yield on demonstration farms, due to better methods, was 21.8 bushels per acre.

Some additional results of the work of the 1,160 field agents of this office in the South are tabulated as follows:

**Additional results of demonstration work in the South.**—Definite demonstration work was carried out by 98,542 adult

farmers on their own farms under the supervision of the agents engaged in demonstration work during the season 1914. Information, advice, and assistance were given to approximately ten times this number through field meetings, farmers' meetings, circular letters, and in other ways. Each farm demonstration serves as an object lesson for the community in which it is located and influences a considerable number of other farmers. Demonstrations embraced all farm crops and included approximately 165,688 acres in corn, 164,000 acres in cotton, 243,364 acres in oats, 390,000 acres in bur and crimson clovers, and 257,000 acres in other legumes; 28,790 acres were put in permanent pastures, 52,000 acres of land limed under the direction of the agents, and 46,000 definite rotation plans adopted at the agents' suggestions.

Among many miscellaneous results accomplished during the year may be mentioned the removal of stumps from 22,800 acres of land, the inoculation of 141,000 hogs, the construction of 1,941 dipping vats, and the erection of 3,411 silos; 212,359 acres of land were drained and terraced in accordance with plans furnished, and approximately 250,000 tons of fertilizers were bought and mixed by the farmers, resulting in a great saving to them and the securing of a higher grade of fertilizers particularly adapted to the desired uses. The general results of demonstration work have been the widespread adoption of better methods, particularly in preparation of the land, in the selection of seed, and in the cultivation of crops. Great interest in live-stock production has been aroused and approximately 25,000 hogs, 8,000 cattle, and more than 4,000 horses, pure bred and grades, have been brought into the territory for breeding purposes.

More than 10,000 field and farmers' meetings have been held with an estimated attendance of 750,000. Approximately 250,000 individual visits to farmers were made during the year. In carrying on the work it is estimated that the agents traveled 2,500,000 miles, wrote 400,000 letters, and distributed 250,000 circulars and bulletins. Tabulated reports of yields on demonstration farms show an average increase of from 50 to 100 per cent over yields on similar lands where demonstration methods were not used. Detailed results of the work in each State are given in the reports of State agents on file with the department. In some instances these reports are published by the agricultural colleges as extension circulars.

**Boys' club work.**—More than 53,000 boys were engaged in club activities in the Southern States in 1914. In the corn clubs 334 boys made 100 or more bushels of corn on their acres. Carl Graves, of Mississippi, made 202 bushels at a cost of 14.5 cents per bushel. The average of all the boys in corn clubs reporting was more than 52 bushels

per acre. The boys who reported made more than 479,000 bushels.

The average of boys reporting in the cotton clubs was 1,231 pounds of seed cotton per acre. John Hubert Ross, of Texas, made 4,500 pounds of seed cotton on one acre.

The average of boys in peanut clubs was 64 bushels per acre. These clubs were organized last year and 80 of the 83 boys enrolled reported. The best record was made by John W. Bell, of Virginia. He made 112 bushels at a cost of 17.8 cents per bushel.

Potato clubs were organized in Maryland and West Virginia in 1914. The average rate of production per acre made by boys reporting was 166 bushels. Frank Calvert, of West Virginia, made 50 bushels on one-eighth of an acre at a cost of 23 cents per bushel.

Several thousand boys planted winter cover crops of clover, rye, etc., on their acres. In Mississippi about 1,100 boys were furnished clover seed to plant one-fourth acre. Inoculating material was furnished by the Government. These boys will save seed. Reports from the field show that where the boys planted their clover early in the season, a splendid crop is being made.

In Georgia and Alabama four-crop clubs on 3 acres were organized. These boys grew corn on the first acre, cotton on the second acre, and oats and cowpea hay on the third acre. Morris Chowder, of Kensington, Ga., made a profit of \$285.49 on his 3 acres of land. Walker Lee Dunson, of Alexander City, Ala., made a profit of \$212.67 on 3 acres of land. These boys were given Percheron mares by the Central of Georgia Railroad as premiums.

Pig clubs have been organized in cooperation with the Bureau of Animal Husbandry in a number of the States. These pig-club boys are taught how to grow pigs at small cost.

In Texas, baby-beef clubs have been organized, and in West Virginia, lamb clubs. Everything points to a larger enrollment in 1915 than in 1914.

**Girls' club work.**—The girls' demonstration work began with the canning clubs in 1910, when four counties in two States were organized. The prospects are that in 1915 there will be an enrollment of 50,000 girls under the supervision of about 400 women agents in the 15 Southern States alone. The enrollment for 1914 was 33,173. Of these club members, 7,793 put up 6,091,237 pounds of tomatoes and other vegetables from their tenth-acre gardens. These products were put into 1,918,024 cans, jars, and other containers. They are estimated to be worth \$284,880.81, and nearly \$200,000 of this is profit. The average profit per member was \$23.30.

Ninety girls in Alamance County, N. C., put up 55,165 cans and jars, valued at \$7,039.65, from their tenth-acre gardens;



136 girls in Etowah County, Ala., put up 46,533 containers, worth \$5,970.17. In Hamilton County, Tenn., 102 girls put up \$14,240 worth of fruit and vegetables, but, of course, this represents the surplus of the farms and orchards as well as their own little gardens.

In Barnwell County, S. C., the girls' club grew and sold more than \$2,000 worth of pimento peppers, and the club of Polk County, Fla., put up and sold about \$7,000 worth of guava products. Club members have made uniform caps, aprons, and dresses, and thus have had good sewing lessons.

Special work has been done with peaches, berries, figs, scuppernongs, mayhaws, ajeritas, oranges, kumquats, and many other fruits of the South. Nearly 3,000 girls now belong to poultry clubs and several hundred have been doing fine work in bread clubs. Many of the best trained club members are succeeding now with winter gardens. In all of these activities the women on the farms have given active help. Fiscal officers, school officers and teachers have cooperated in many ways.

The individual records of thousands of the club members were excellent in 1914. Hester Sartain, of Walker County, Ala., grew 7,037 pounds of tomatoes. She put up 1,620 cans, jars, and bottles, and the entire output at market prices was valued at \$221.35, of which \$146.20 was profit. Cora Brown, of Polk County, Ga., produced 5,290 pounds and made a profit of \$122.16, and Lois Robertson, of Comanche County, Tex., realized a profit of \$193, counting 4,868 pounds of tomatoes grown in her garden and the fruit she put up from the orchard and farm. Many other records were almost as good, and their work is expanding and developing.

Thousands of mothers and women generally have enrolled in the home demonstration work this year. Most of them started the work by making a home-made fireless cooker and then utilizing some poultry products which they have grown and the canned products put up by the girls in preparing some nutritious and wholesome food.

In quite a number of places the county agents have shown these home demonstrators how to grade eggs, and egg-selling associations have been formed, resulting in better prices and also in a demand for better breeds of chickens. Demonstrations are being made and instructions given in bread making and butter making, in which both the girls and the women take part.

These lines of work call for better home conveniences and better sanitation. Numerous home-made devices are being made and shown by these demonstrators. Some of these are iceless refrigerators, flytraps, ironing boards, wheel trays, bread mixers, and butter molds. The county agents are using the different steps to lead directly to the screening of doors and windows, the installing of waterworks, and the beautification of the homes.

## ENTOMOLOGY ITEMS.

(Contribution from the Bureau of Entomology.)

The following abstracts of publications of the Bureau of Entomology do not include a number of popular bulletins discussed fully in the issues of the Weekly News Letter.

**Gipsy moth work.**—The Federal work against the gipsy moth in New England, begun in 1905, is now organized under the following heads: (1) Experimental work, including the introduction, colonization, and study under laboratory and field conditions of the parasitic and predatory insect enemies of the gipsy moth; a study of the disease of gipsy moth larvæ known as wilt; an investigation of the food plants of the gipsy-moth larvæ for the purpose of determining what species of trees and shrubs are most favored by the larvæ as food and what are least favored; experiments to determine the normal increase of the gipsy moth in the field and the increase where deterrent elements such as parasites, wilt, and unfavored food plants were present in varying degrees; a study of the various factors, artificial and natural, responsible for the spread of the gipsy moth in its various stages into new territory, particular attention being given to the remarkable carriage of the first-stage larvæ by the wind; the investigation of secondary insect enemies, such as bark and wood borers, of trees primarily weakened by defoliation by gipsy-moth caterpillars. (2) Silvicultural work, in cooperation with the Forest Service, having for its object such changes in the stands of timber as will make them less susceptible to gipsy-moth attack and will at the same time increase their commercial value. (3) Scouting work, which consists in examining the territory along the outside border of infestation, and in treating the gipsy-moth colonies adjacent to the border for the purpose of preventing spread to other parts of the United States. (4) Quarantine work or the administration and enforcement of the quarantine against the gipsy moth and brown-tail moth declared by the Federal Horticultural Board, in order to prevent the shipment of these insects in any of their stages from infested to uninfested portions of the United States on trees, forest products, stone and quarry products, Christmas trees, etc. (5) Cooperative work, involving the correlation of the Federal activities with those of the States concerned, the preparation of educational posters and post cards showing the life histories of the gipsy and brown-tail moths and their principal introduced enemies, and their distribution to post offices, granges, libraries, and schools, the preparation of special exhibits for expositions in the infested territory, and the advice of property owners concerning the methods which should be taken by them to prevent serious damage to their trees. The

report goes to show that the work is well organized and that each section is accomplishing good results. Through the scouting and quarantine work it has been possible to restrict the spread of the gipsy moth very materially toward the westward; the work of natural enemies has helped considerably in decreasing the amount of infestation; and the importance of bringing forest lands into a growth which is unfavorable to the development of the gipsy moth is proven to be very great, and is therefore urged strongly. The bulletin, which is No. 204, "Report on the Gipsy Moth Work in New England," by A. F. Burgess, contains several maps to illustrate the progress and extent of the work under the several heads.

**Wilt of gipsy-moth larvæ.**—The disease of gipsy-moth caterpillars known as wilt is not known to have occurred in America, so far as accounts go, prior to the year 1900, although the gipsy moth, *Porthetria dispar*, was introduced from France into Massachusetts in 1869 and became a serious pest in 1889. How the disease reached here is not known, but it appears that some of the imported parasites of the gipsy moth, such as the tachinid fly, *Comptosia concinnata*, in the various stages of their life history are well adapted to aid in the rapid spread of the disease. The paper, "Wilt Disease of Gipsy-Moth Caterpillars," by R. W. Glaser, in the May number of the Journal of Agricultural Research, gives the results of an investigation of the etiology of the disease carried out by the author and Dr. J. W. Chapman. The distribution, epidemiology, and pathology of the disease are also treated. Among the conclusions reached are the following: Wilt is a true infectious disease that is distributed over the entire territory infested by the gipsy moth; epidemics of the disease occur only in localities heavily infested by the moth; climatic conditions appear to bear an important relation to wilt in the field; the disease is more prevalent among older than among younger caterpillars, but small caterpillars also die of it in the field; no diagnosis of wilt is valid unless the presence of polyhedral bodies is demonstrated microscopically; these polyhedra are probably reaction bodies belonging to the highly differentiated albumins, the nucleoproteids; the polyhedra originate in the nuclei of the tracheal matrix, hypodermal, fat, and blood cells; bacteria are not etiologically related to wilt; the virus of wilt is filterable with difficulty; caterpillars that have died from infection with filtered virus are flaccid, completely disintegrated, and full of polyhedra; infection naturally takes place through the mouth by means of the food; although probable, there is no definite evidence as yet that wilt is transmitted from one generation to another; genetic immunity of certain individuals is probable.



**Maggot trap for house fly.**—Bulletin 200, "A Maggot Trap in Practical Use; an Experiment in House-Fly Control," by R. H. Hutchison, describes the structure of, and the method adopted in using, a platform maggot trap devised for the purpose of destroying house-fly maggots in large masses of manure. The experiments which form the basis for this publication, and which are detailed therein, were conducted at the Maryland Agricultural College. This trap takes advantage of the pronounced migratory habit of the maggots just prior to pupation: the maggots, on leaving the manure, dropping into a shallow concrete basin containing water, underneath the platform, and thus perishing. In these experiments all the manure from a stable in which three horses were kept was stored on the platform. The results obtained during August and September seemed to show that at least 98 per cent of the larvæ breeding in the manure were destroyed. Fly counts made before and after the trap was installed indicated an average reduction of from 67 to 76 per cent. That the reduction of flies did not correspond to the percentage of larvæ destroyed was probably due to the presence of several other breeding places well within the range of flight. It was found that the trap was not so effective in late fall as during the summer and early fall, since low air temperatures deter the maggots from migrating. Care is necessary to prevent the accumulation of straw and débris under the platform and the breeding of mosquitoes in the water in which the maggots are caught. Among the merits of the maggot trap are (1) the comparatively small initial cost and absence of money outlay necessary for its maintenance, (2) the very small amount of additional time or labor required in its operation, (3) the ease with which wagons or manure spreaders can be loaded from the platform, and (4) its adaptability for use at stables where the daily production of manure is large. Finally it is suggested that the same conditions which render the trap effective are the ones which tend to preserve the fertilizing value of the manure.

**Codling moth.**—Bulletin 189, "Studies of the Codling Moth in the Central Appalachian Region," by F. E. Brooks and E. B. Blakeslee, is based on band-record studies conducted in 1911, 1912, and 1913 in various localities in Virginia, West Virginia, and Maryland ranging in latitude from Charlottesville, Va., to Hagerstown, Md., and in altitude from 400 to 3,500 feet above sea level. The chief features of the investigations consisted in the banding of suitable apple trees with strips of burlap, collecting at regular intervals the larvæ that went beneath the bands to spin up, and rearing these larvæ in jars kept in the localities where the larvæ were collected. Examinations of the bands and rearing jars were made every week or 10 days in 1911 and

twice a week in 1912 and 1913. In the region covered the codling moth was found to produce one full brood of larvæ and a partial second brood, the size of the second brood depending more or less on the latitude and altitude of the locality. The studies show a marked difference in the time of appearance of the different broods in different localities. There seems, however, to be no constant rate of difference between the earlier and later localities. This seems to be largely due to the responsiveness of the species during its metamorphic changes to local and transient weather conditions. Records of the numbers of larvæ collected from trees on which bands were placed around the trunks and also around the bases of the larger branches indicate that 41.49 per cent drop to the ground and then ascend the trunk to pupate and 58.51 per cent crawl down the branches from the infested fruit to pupate. A number of parasitic and predaceous enemies were recorded.

**Arizona wild cotton weevil.**—Bulletin 233, "Relation of the Arizona Wild Cotton Weevil to Cotton Planting in the Arid West," by B. R. Coad, contains an account of a geographical race of the Mexican cotton-boll weevil known as *Anthonomus grandis thurberiae*, discovered in 1913 by Mr. O. F. Cook, of the Department of Agriculture, infesting the wild cotton plant, *Thurberia thespesioides*, in some of the mountains in southeastern Arizona. The knowledge of the presence of this weevil in southwestern territory not yet invaded by the true cotton-boll weevil at once raises the question whether the *Thurberia* weevil will transfer its attacks to cotton, and if so, whether it occurs in connection with its wild food plant in localities adjacent to areas in which cotton culture has been or is likely to be started. This bulletin summarizes data previously published in other places which proved that the *Thurberia* weevil will transfer its attack to cultivated cotton quite readily. The species seems to be particularly concentrated in the mountain ranges surrounding Tucson, and may attack cotton in the Santa Cruz and Rillito Valleys at an early date. While its present habits are such that it would not injure cotton greatly, these habits will probably be changed to a certain extent and more injurious ones acquired. Its present habits render it quite probable that the control of the *Thurberia* weevil will be a very different problem from that of the cotton weevil and more easily solved. A careful watch should be maintained for the first appearance of the weevil on cultivated cotton in order that it may be combated successfully. It is quite probable that with a more intimate knowledge of the extent of the weevil distribution in Arizona it will be possible to establish local quarantines of seed-cotton shipments which will at least keep the weevils out of the localities which do not have the species present in nature.

**Citrus and fruit fly.**—Since the discovery in 1910 that the dreaded Mediterranean fruit fly, *Ceratitis capitata*, had become established in the Hawaiian Islands, the fruit growers, and especially the citrus fruit growers, of California and Florida have had grave fears that this pest would be able to gain access to the mainland on some of the many ships plying between Honolulu and the Pacific coast and would make its appearance in the citrus orchards. Although this danger is a serious and an ever-present one, it appears, from data secured in the Hawaiian Islands and recorded in a paper, "Susceptibility of Citrus Fruits to the Attack of the Mediterranean Fruit Fly," by Messrs. E. A. Back and C. E. Pemberton, in the January number of the Journal of Agricultural Research, that the fruit fly is not the serious pest to citrus fruits that previously published literature would indicate. While grapefruit, oranges, lemons, and many limes may become quite badly infested with well-grown larvæ if allowed to remain on the trees long after they become sufficiently ripe for the market, nature has so well equipped them to withstand attack that the larvæ are seldom found in their pulp until they are much overripe. When the fruit fly attacks citrus fruits the oil of the cells ruptured in the formation of the egg cavities kills a large percentage of the eggs and newly hatched larvæ, and larvæ that succeed in entering the rag are able, owing to the imperviousness of the latter, to reach the pulp in astonishingly small numbers. Climatic conditions adverse to the fruit fly's development and survival, at a season when citrus fruits are most susceptible to attack; solid plantings of citrus in commercial orchards; a scarcity of noncitrus host fruits; the ease with which the fly can be reduced by spraying with poisoned baits; and the general practices followed in harvesting fruits are all reassuring indications that the citrus-fruit industry of the United States can successfully cope with the fruit fly even should it, most unfortunately, be introduced.

**Pear thrips.**—"The Life History and Habits of the Pear Thrips in California" is the title of Bulletin 173, by S. W. Foster and P. R. Jones. It contains the results of an investigation of the pear thrips, *Taeniothrips pyri*, extending over some six years. Since it first attracted attention in 1902 the pear thrips has caused many millions of dollars damage to the deciduous fruit industry in the State of California. Its appearance in New York State in 1911, in Pennsylvania in 1912, and in Maryland in 1914 indicate that it may eventually become a serious pest in the East. While pears and prunes are the fruits which suffer most, cherries, apples, peaches, apricots, and almonds are injured to a greater or less extent. While the centers of infestation in California are Santa Clara, Contra Costa, and Solano Counties, the pear thrips occurs in considerable num-



bers in Alameda, Sacramento, Yolo, Napa, Sonoma, San Joaquin, and San Benito Counties.

**Fruit fly and parasites.**—"Life History of the Mediterranean Fruit Fly from the Standpoint of Parasite Introduction" is the title of a paper by Messrs. E. A. Back and C. E. Pemberton in the February number of the Journal of Agricultural Research. Since the discovery of the establishment of the fruit fly in the Hawaiian Islands especial efforts have been made by the Hawaiian Board of Agriculture and Forestry to introduce the natural enemies of the fruit fly from western Africa as an aid to its control. While Dr. F. Silvestri, as special agent of the board, was successful in introducing three hymenopterous parasites, namely, *Galesus silvestrii*, *Dirhinus giffardii*, and *Opius humilis*, he failed to introduce *Tetrastichus giffardii*, another hymenopterous parasite which gives even greater promise in the control of the fruit fly.<sup>1</sup> The first three parasites are capable of living several months in glass tubes, hence the ease with which they were successfully transported, but *Tetrastichus* is short lived and in addition oviposits in either the egg or the young larva of the fruit fly, so that continuous rearings of the host insect would have been necessary in order to provide the parasite with food during the long voyage. The present paper describes the life history of the fruit fly with especial reference to certain extremely simple methods of rearing it in large numbers which have been worked out by the authors in the course of their experiments, and which will result in the saving of much time and in preventing many failures in connection with any subsequent efforts to introduce this *Tetrastichus* or other parasites of similar habits from western Africa into the Hawaiian Islands.

**Alfalfa hopper.**—The January number of the Journal of Agricultural Research contains an article by V. L. Wildermuth on the "Three-Cornered Alfalfa Hopper," *Stictocaphala festina*, a member of the hemipterous family Membracidae, which, since the year 1910, has been known to injure crops of alfalfa and clover, cowpeas, and other legumes. This paper, based on studies of the insect in its occurrence on alfalfa in the irrigated valleys in Arizona and on alfalfa and cowpeas in Mississippi, is the first detailed account of the habits and life history of the species. Injury is due to the sucking of plant juices by both adults and larvæ and the development of a feeding scar which often takes the form of a ring or girdle and which is usually accompanied by a gall formation. The eggs are deposited in the stems of the food plants, usually back of the sheath leaves or below the surface of the ground. In cowpeas they are deposited in pockets on the stems. In southern Arizona

there are four generations a year, and during extremely mild seasons the adult insects are active throughout the season. During the colder winters the species hibernates in both the egg and adult stages. The alfalfa hopper is little affected by natural enemies and is only reduced in numbers by the variable winter temperatures. The Sonoran red-winged blackbird was found to feed upon the species. The cleaning up of places of hibernation and the eradication of weeds, rubbish, etc., are the only control measures that appear to be of value.

**Huisache girdler.**—A long-horned beetle and its larva, *Oncideres putator*, causes serious injury to the huisache tree, *Acacia farnesiana*, a beautiful flowering shrub and shade tree in common use in the lower Rio Grande Valley and other parts of the Southwest, and is also injurious to mesquite. The beetles possess powerful mandibles and saw with ease branches  $1\frac{1}{2}$  inches in diameter, completely severing them from the main body of the tree. The writer observed as many as 63 branches thus severed from one tree, some of which measured 40 millimeters in diameter, the average ranging from 22 to 35 millimeters. Since the insect spends at least 10 months in the severed branch during the egg, larval, and pupal stages, control is only a matter of collecting and burning the pruned branches. This work can best be done from the first week of January to the 1st of August. The insect is treated in Bulletin 184, by M. M. High, under the title "The Huisache Girdler."

**Verbena bud moth.**—*Olethreutes hebesana*, popularly known as "the verbena bud-moth," is treated under that title in Bulletin 226, by D. E. Fink. So far as known this species has confined its injuries solely to flowering plants. It has been reared from and found injurious to tiger flower (*Tigridia pavonia*), snapdragon (*Antirrhinum* spp.), flag (*Iris* spp.), hedge nettle (*Stachys palustris*), mullein (*Verbascum thapsus*), verbena (*Verbena* spp.), closed gentian (*Gentiana andrewsii*), and false foxglove (*Dasystoma flava*). The account includes history, synonymy, distribution, descriptions of the stages, habits and seasonal history, and methods of control, together with a bibliography. Two control measures were found effective against the larvæ: (1) Spraying with arsenate of lead or arsenite of zinc combined with fish-oil soap and (2) cutting back and destroying infested stalks.

**Reports.**—In the series of Reports of the Office of the Secretary there are three contributions from the Bureau of Entomology, as follows: No. 99, "Classification of the Cryphalinae, with Descriptions of New Genera and Species," by A. D. Hopkins; No. 101, "The Woolly Apple Aphid," by A. C. Baker; No. 102, "Descriptions of Some Weevils Reared from Cotton in Peru," by W. Dwight Pierce.

## PLANT INDUSTRY REVIEWS.

(Contribution from the Bureau of Plant Industry.)

The potato, the sixth crop in agricultural importance in the United States, is the subject of a bulletin (195) entitled "Potato Breeding and Selection," contributed by William Stuart, consisting of 35 pages and 16 plates.

The history of potato breeding is discussed and details of much experimental work undertaken by the experts of the Department of Agriculture are given. In conclusion, Prof. Stuart states that the data presented seem to justify the following statements:

(1) That the potato crop of the United States is of sufficient economic importance to demand a most careful study of all favorable and unfavorable factors influencing the yield.

(2) That the economic use made of the potato in this country is relatively unimportant when compared to that of Germany.

(3) That deterioration of our cultivated varieties through improper cultural practices and through disease necessitates the improvement of existing varieties through the exercise of greater care in the selection of the seed and through the development of new seedling varieties possessing greater disease resistance or better commercial qualities.

(4) That the term "plant breeding," when applied to the potato, should be construed as sexual rather than asexual reproduction. In other words, it is believed that a distinction should be made between "breeding" and "selection."

(5) That the work of Goodrich as a potato-plant breeder was epoch making, in that it resulted in giving us the progenitor of the world-famous Early Rose.

(6) That while the growing of seedling potatoes may offer greater possibilities than selection alone, the latter method can be practiced with much greater ease than the former. Breeding can be indulged in only by the few, while selection may be engaged in by the many.

(7) That the almost total failure of our present-day commercial varieties to produce seed balls is due to male sterility rather than to imperfect pistils or ovaries.

(8) That the commonly accepted theory regarding the inadvisability of allowing more than one or two seed balls to develop on a cyme, on the assumption that weak seedlings would result, is not substantiated in crosses 8708, 8709, and 8718, which developed five and six seed balls apiece.

(9) That the data secured from some of the crosses indicate very strongly that some varieties are prolific seed bearers, while others are not.

<sup>1</sup>Since this paper was prepared *Opius humilis* has proved to be a very efficient fruit-fly parasite in the Hawaiian Islands.



(10) That the tuber-unit and hill-selection methods of seed selection are chiefly valuable in pointing out the weak, unproductive, and diseased seed tubers.

**Strawberries.**—"Strawberry Growing in the South" is the title of a new Farmers' Bulletin (No. 664), prepared by H. C. Thompson. Methods of propagation, the choice of a location, and soil selection and preparation are considered and the proper fertilizers discussed. The various systems of growing strawberries are described and illustrated. Methods of cultivation are recommended, varieties described, and suggestions made covering the picking and packing of the fruit, strawberry by-products not being overlooked. The average cost of production in the South is stated to be from \$75 to \$90 an acre.

The strawberries grown in the United States had a value of 18 million dollars in 1909, three-fourths of the total for all small fruits.

**Crown-gall.**—Bulletin 203, "Field Studies of the Crown-Gall of Sugar Beets," shows that there are at least two types of sugar-beet galls and that the crown-gall is caused by a bacterium or closely related bacteria. These galls appear to have an injurious effect on the quality of the roots, while the galls themselves are 100% in purity and detrimental in the milling processes. Though sometimes causing the beet roots to decay, the galls do not seem to affect the tonnage of the beets. The disease may be held in check by rotations with grain-producing plants.

**Spring wheat.**—Bulletin 214, entitled "Spring Wheat in the Great Plains Area: Relation of Cultural Methods to Production," by E. C. Chilcott, J. S. Cole, and W. W. Burr, covers a study of the yields of spring wheat under various methods of seed-bed preparation at 14 stations in the Great Plains region, an area consisting of about 400,000 square miles of territory and covering parts of 10 States.

The conclusions reached are that extremely unfavorable climatic conditions can not be overcome by cultural methods; it is only when the seasonal rainfall deficit is so small that it can be overcome by moisture stored in the soil that the cultural methods tested have shown important effects; when the differences in value of yields are less than the differences in cost of production, cost becomes the determining factor; some soils show little response to cultural methods; to reduce the cost of production is more important in determining profits than to increase yields by cultural methods; northern Colorado and Kansas appear to be the southern limit of profitable spring-wheat production in this area; disked corn ground has given high yields and the highest average profit or lowest average loss at all stations

except one; furrowing with a lister and leaving the surface ridged through the winter has resulted in a slight increase over plowing in some cases; the differences in yields following fall plowing and spring plowing are very small; subsoiling has proved of doubtful utility, while summer tillage has usually given the highest yields of any method under trial. The most expensive method of culture used in these tests was green manuring.

**Barley.**—A bulletin embodying a study of the data obtained from different methods of seed-bed preparation for barley and of the cost of production under each of various methods was issued on May 24 as No. 222 of the department series. This bulletin is entitled "Barley in the Great Plains Area: Relation of Cultural Methods to Production." Its authors are E. C. Chilcott, J. S. Cole, and W. W. Burr, of the Office of Dry-Land Agriculture. The area included in these investigations covers a part of 10 States, viz, Montana, North Dakota, South Dakota, Wyoming, Nebraska, Colorado, Kansas, Oklahoma, Texas, and New Mexico. It extends from the ninety-eighth meridian of longitude to the foothills of the Rocky Mountains and from the Canadian border to the thirty-second parallel. The results of experiments covering a series of years at 14 different field stations are separately given, and general conclusions drawn therefrom are stated.

Differences in the climatic conditions of varying seasons are shown to cause much wider variations in yields than differences in cultivation, which cover a wide range, as fall plowing, spring plowing, listing, subsoiling, green manuring, etc.

**Alfalfa.**—Bulletin 228, entitled "Effect of Frequent Cutting on the Water Requirement of Alfalfa and its Bearing on Pasturage," by Lyman J. Briggs and H. L. Shantz, reports upon investigations designed to determine whether alfalfa in the early stages of growth following a cutting has a water requirement differing from the water requirement of the plant during the normal period of growth and to what extent frequent cutting or grazing during the hottest part of the year modifies the seasonal water requirement.

The efficacy of reducing the aerial portion of a plant by frequent cutting or clipping or by grazing, as a means of moisture conservation during periods of drought, is demonstrated. The resort to summer grazing when the supply of moisture is insufficient to produce a normal crop is believed to afford a simple and practicable means of obtaining a return from alfalfa commensurate with the available moisture and at the same time it reduces the danger of injury by drought. Intermittent grazing, i. e., using several fields in rotation, is recommended.

**Native pasture grasses.**—The economic value of the numerous range forage plants entering into the beef, mutton, and wool-producing rations of grazing animals is the subject of an important investigation now in progress in the Office of Farm Management, which becomes a unit of the Office of the Secretary on July 1. The laboratory work of making analytical chemical determinations is done by the Cattle-Feed and Grain Investigation Laboratory of the Bureau of Chemistry. An installment report covering the "Native Pasture Grasses of the United States" has been issued under date of May 26, as Bulletin 201 of the departmental series, by David Griffiths, George L. Bidwell, and Charles E. Goodrich.

Since it is evident from past experiences that over most of the native pastures of our country the chief dependence must be placed upon the forage plants that are indigenous to the different regions, it is highly important that these native species should receive continuous and careful study. This professional paper is intended as a contribution toward a better knowledge of the problems involved. Genera ranging through the alphabet from *Agropyron* to *Zizaniopsis* are considered severally from the standpoint of range management, and the results of very numerous chemical determinations of composition are given, generally in tabular form.

**Jack pine.**—Because the jack pine (*Pinus divaricata*) is comparatively free from a number of the diseases which are common on other conifers and is resistant to drought, winter injury, and frost, it is admirably suited for reforesting many of the dry sandy regions of the North Central States.

A professional paper entitled "Observations on the Pathology of the Jack Pine," by James R. Weir, was issued on May 26 as Bulletin 212 of the department series.

The most important fungous disease of the jack pine is caused by *Peridermium coccineum*, the control of which in many localities is a serious forest problem. This fungus attacks all age classes, causing the death or early suppression of trees of tender years and seriously interfering with the propagation and development of more mature growth. Methods for its control are suggested.

**Weeds.**—Farmers' Bulletin 660, entitled "Weeds and How to Control Them," by H. R. Cox, contains within its 29 pages a mass of information on the subject treated, no less than 27 text figures illuminating its presentation. A descriptive table of the fifty worst weeds is given as an appendix.

The main principles of weed control are preventing weeds from going to seed, preventing the introduction of weed seeds on the farm, and preventing perennial weeds from making top growth. It is demonstrated that



by following these rules a farmer may make his farm practically weed free.

**Farm demonstrations.**—The Office of Farmers' Cooperative Demonstrations in the North and West has brought out in the May number of the Farm Demonstration Monthly articles on the value of a county organization, farm home-management demonstrations, the farm labor problem, and membership and fees in farm bureaus, with extracts from the reports of many county agents engaged in this work.

#### Memorandum No. 140.

(Continued from page 4.)

demonstration work and the Smith-Lever agricultural extension work in 15 Southern States; (4) the Office of Extension Work in the North and West, including the farmers' cooperative demonstration work and the Smith-Lever agricultural extension work in 33 Northern and Western States, and (5) the Office of Home Economics, including investigations relative to foods, clothing, and household equipment and management.

The work of the service relating to agricultural instruction and to farmers' institutes and similar organizations shall be under the immediate direction on the director, and the work relating to farmers' institutes and similar organizations shall be carried on in close cooperation with the offices of extension work.

The States Relations Service will take under consideration matters relating to all the extension work carried on by the several bureaus and offices of the department, and those connected with the administration of the Smith-Lever Extension Act. All plans for demonstration and extension work originating in any bureau or in any State should first be submitted to the States Relations Service, which will make recommendations regarding them to the secretary. Approved plans for demonstration and extension work by any bureau should not be put into operation in any State until they have been brought to the attention of the director of the States Relations Service and an opportunity has been given for arranging with the extension directors of the agricultural colleges regarding the execution of these plans in the States concerned.

Correspondence and personal inquiries regarding the extension work of the State agricultural colleges which come to the offices of the Secretary and Assistant Secretary will be referred to the Director of the States Relations Service, under whose supervision replies will be prepared and given out, except that questions involving the policy of the department, legal and administrative rulings, and approval of plans of work and expenditures shall be referred back to the Secretary's office and the replies shall be given out from that office.

This order shall become effective on July 1, 1915.

D. F. Houston,

JUNE 8, 1915.

Secretary.

## PLANT QUARANTINES.

(Contribution from the Federal Horticultural Board.)

The Federal Horticultural Board held an informal conference May 10 with a number of Maine delegates to discuss suggested changes in the present system of inspecting potatoes from the areas infected with powdery scab.

Among those present were Senator Johnson, Senator Burleigh; Representatives Guernsey, Peters, and Hinds; Mr. Guptill, commissioner of agriculture of Maine; representatives of the Maine Central and Bangor & Aroostook Railroad companies; officials of the Aroostook County Potato Growers Association; and several large potato shippers.

Three propositions were presented for the consideration of the board in relation to the quarantine on account of the powdery scab of potato, namely:

- (1) To lift the quarantine altogether.
- (2) To suspend the quarantine for the balance of the shipping season for the crop of 1914.
- (3) To return to the original plan of inspection and certification at point of origin, or at least to transfer the preliminary inspection to the point of origin of the potatoes.

As a result of a very thorough discussion of the powdery scab situation, it was determined to maintain the present system of inspection for the balance of the shipping season of the 1914 crop. To determine the present distribution of the disease the board will make a thorough survey of potatoes as they are dug, beginning this month with the potato crop of Florida and Texas and following the digging season northward.

With the kuowu rather wide distribution of diseased potatoes, both from European sources and from Maine, such a survey should pretty well demonstrate whether the powdery scab disease is one to be especially feared outside of the peculiar climatic conditions which seem especially suited to its development in Maine, northern New York, and similar northern potato regions of this country and Canada. A very mild outbreak of the disease, negligible from actual damage, has been discovered in Florida, and it is probable that similar mild outbreaks may be found throughout the southern potato-growing regions. If this proves to be the case, the question of lifting the quarantine prior to the movement of next season's crop may be considered. It is, however, necessary to have more definite information as to the spread of the disease throughout the South and West, and especially as to its dangerous quality for such regions, before it will be possible to recommend the lifting of the quarantine.

To relieve a fear which seemed to be widespread in Maine, the potato growers and

shippers were advised that the board had no thought of recommending to the Secretary of Agriculture the placing of an absolute embargo at any time on the interstate movement of potatoes grown in the infected districts, and, furthermore, that the history of this disease left no warrant for such action. In view of the fact that any movement of potatoes from an infected district, even with the most thoroughgoing precautions, is attended with danger of some carriage of diseased tubers, such movement can only be justified under a certification such as is now given, which calls attention to this danger and indicates that the potatoes are for food purposes; in other words, for such use as will be unlikely to establish the disease in new territory.

**Chestnut-bark disease.**—A public hearing was held at the department May 18, 1915, on the subject of a proposed quarantine on account of the chestnut-bark disease. This disease already exists more or less generally in the States of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, and West Virginia, and scatteringly in the States of Ohio, North Carolina, Iowa, and Nebraska, and will inevitably in the course of time extend throughout the range of the native chestnut. The principal object of the proposed Federal quarantine is to prevent the carriage of the disease by means of chestnut nursery stock to the regions beyond the range of the native chestnut and where orchard plantings of this tree are already beginning and will considerably expand in future years.

The hearing was attended by a number of department representatives; former members of the Pennsylvania Chestnut Tree Blight Commission; Mr. C. K. Sober, Lewisburg, Pa., the owner of what is probably the largest chestnut grove and nursery in the United States; Representatives Benjamin K. Focht and J. V. Leshner, and several others.

The important new information developed at this hearing was the possibility of control of the disease under orchard conditions in a measure, as demonstrated in the chestnut orchards and nurseries of Mr. Sober, occupying some 400 acres of reclaimed mountain land in Pennsylvania. If such control under orchard conditions proves practicable, and in view of the fact that the infected plants have already been shipped pretty extensively throughout the country, it may not be necessary to establish a Federal quarantine. No action will be taken, therefore, pending further investigation of the possibility of the control of the disease under orchard conditions and the securing of more definite data concerning the western distribution of the disease.

**Moth hearing.**—The public hearing necessitated by the annual revision of the gipsy



moth and brown-tail moth quarantine to bring within the quarantine lines the new territory infested by these insects during the previous year was held at this department May 6, 1915.

The hearing was attended by the officials charged with the field administration of the quarantine; Mr. I. W. Davis, assistant entomologist of the Connecticut State Agricultural Experiment Station, New Haven, Conn.; Mr. W. C. O'Kane, deputy commissioner of agriculture, in charge of moth work, Durham, N. H.; Mr. Harry B. Weiss, of the office of the State entomologist, New Brunswick, N. J., and several others.

The additional gipsy moth territory which will be included in the revised quarantine order which will become effective July 1, 1915, consists of the following towns: Anson, Dixmont, Orrington, Lamoine, Trenton, *Maine*: Hannover, Lebanon, Enfield, Gratton, Grantham, Plainfield, Cornish, Croyden, Claremont, Unity, Charlestown, Lempster, Acworth, Langdon, Marlow, Alstead, Walpole, Westmoreland, Surrey, Gilsum, Sullivan, *New Hampshire*: Norwich, Hartford, *Vermont*: Leyden, Deerfield, Montague, Wendell, West Brookfield, Brookfield, Warren, Brimfield, Sturbridge, Holland, Wales, Palmer, Monson, *Massachusetts*: Eastford, Hampton, Chaplin, Scotland, Canterbury, Mansfield, Plainfield, Sterling, Griswold, Lisbon, Sprague, *Connecticut*. Hitherto the gipsy moth had not extended its range into Vermont.

It was not found necessary to extend the quarantine line this year on account of the brown-tail moth, and the three towns on the eastern end of Long Island which are included in the quarantine now in force on account of this insect have been eliminated.

The major portion of the hearing was devoted to a discussion of the practicability of the inspection and certification of "Christmas trees." Ever since the promulgation of the original quarantine on account of these two insects, November 5, 1912, the shipment of plants commonly described as "Christmas trees" and "Christmas greens" from the territory infested by the gipsy moth has been prohibited, for the reason that it was deemed practically impossible to examine with sufficient thoroughness the large quantity of material of this nature in the comparatively short time during which these articles are collected for shipment. At the earnest and insistent request of one of the principal shippers of "Christmas trees" in New England, it is proposed, this year, to give a trial to the inspection and certification of "Christmas trees" and "greens," and to allow their movement under regulation. "Christmas trees" and "greens" to be inspected and certified must be assembled at the shipping point in common with other articles which are allowed to move only after inspection.

#### STONE AND QUARRY PRODUCTS QUARANTINE.

The gipsy moth deposits its egg masses indiscriminately on stone and quarry products, as well as upon trunks of trees, lumber, etc., and the danger resulting from the free and unrestricted movement of stone and quarry products from the gipsy moth territory was early recognized. Stone and quarry products could not be included under the plant quarantine act, which is limited in its application to plants and plant products. In the special appropriation for preventing spread of moths for the Bureau of Entomology of this department, the Secretary of Agriculture is authorized to establish and maintain a quarantine against further spread in such manner as he shall deem best, and under this authority a quarantine was issued October 23, 1914, regulating the movement of stone and quarry products. Such products are now subject to the same system of inspection and certification as applies to plant and wood products. The same revision necessarily applies to the stone and quarry products quarantine, and this quarantine has been reissued effective July 1, 1915, to include the additional territory infested with the gipsy moth during the past year. The regulations governing the interstate movement of stone and quarry products are identical with those governing the interstate movement of plants and plant products under the gipsy moth and brown-tail moth quarantine. The restrictions, however, apply merely to the gipsy moth, stone products not being in any way connected with the brown-tail moth distribution.

#### THE 1914 YEARBOOK.

The first delivery of the Yearbook for 1914 was made to the Division of Publications May 26, and copies have been placed in the hands of department officials.

An allotment has been made to each bureau, division, and office, and copies will be mailed to such addresses as they may furnish. Employees desiring copies should procure them by orders upon the Division of Publications, approved by their chief.

A card index is maintained in the division so as to prevent duplication in the distribution. In case the distribution is to regular lists, the names thereon are indexed. It is necessary, therefore, that names of persons should be furnished with all orders.

The limited number of copies of the Yearbook allotted to the department makes it necessary to exercise every precaution to prevent waste in its distribution.

#### WEATHER ITEMS.

(Contribution from the Weather Bureau.)

The Weather Bureau announces that the present practice of preparing and distributing night forecasts at the office at Washington, D. C., for all States east of the Rocky Mountains will be modified on June 1, 1915.

On and after that date night forecasts and special warnings (except storm warnings) based on observations taken at 8 p. m., seventy-fifth meridian time, for Illinois, Wisconsin, Minnesota, Iowa, Missouri, Kansas, Nebraska, South Dakota, North Dakota, Montana, and Wyoming will be prepared at and distributed from the Weather Bureau office at Chicago, Ill., and those for Colorado, Utah, Arizona, and New Mexico from the office at Denver, Colo.

With the exceptions stated the service of weather information at night now furnished from the Weather Bureau office at Washington, D. C., will be continued.

This plan will facilitate the press distribution of the forecasts as well as allow more time for their preparation.

**Weather and crop yield.**—The vital relation between weather conditions and crop yield has recently received considerable attention by investigators, with a view to determining more definitely just what favorable or unfavorable weather means to the farmer as affecting the returns from his labor.

There appeared in the February number of the Monthly Weather Review (issued in May) a paper entitled "A Correlation of Weather Conditions and Production of Cotton in Texas," by Mr. Joseph B. Kiucser, of the Weather Bureau, giving some results of recent investigations along this line. In this paper the author effected a correlation of the departures of precipitation and temperature from the normal during the growing season with the departure of the yield of cotton from the average, for the 20-year period 1894 to 1913, inclusive. The monthly departures of temperature and precipitation were taken as the meteorological basis. These were amplified by the introduction of auxiliary factors to represent the modifying influence of certain associated combinations of rainfall and temperature conditions, of soil-moisture conditions at the beginning of each month, and the intensified effect due to long-sustained periods of unfavorable weather, on which basis an equation was formulated for computing from meteorological conditions the departures from the average yield of cotton. The application of this equation to the rainfall and temperature departures for the 20-year period under consideration gave computed values, which, when correlated with the actual values, indicated a correlation coefficient of +0.88, and a prob-



able error of  $\pm 0.03$ . Most writers agree that it is safe to assume that the relation of one factor to another is established beyond question if the correlation coefficient be at least six times the probable error. In this case the nearness of the correlation coefficient to unity, and the inconsequent value of the probable error, show a remarkably close relationship.

**Exploration of the upper atmosphere.**—The exploration of the upper atmosphere by means of kites and balloons, formerly carried on at Mount Weather, is now being continued at the Drexel (Nebraska) Aerological Station and at its Fort Omaha auxiliary.

Most of the inside work needed in connection with the installation of the kite-flying equipment was completed during the winter months. Just now the force is busy in the kite field. Excavation has been made and the concrete foundation is being laid for the track on which the rotating reel house is to be mounted. The reel house will stand in the middle of a square 40-acre field, so that a clear space of 220 yards in any direction from the kite reel will be available in which to launch and land the kites.

While this installation is in progress on the Drexel farm, preparations for a second series of free balloon ascensions at Fort Omaha, under way during April, are now complete. In addition to the calibration of the balloon meteorographs, which is done at the central office in Washington, these preparations include the making of hydrogen gas for use in the balloons. The hydrogen is produced electrolytically, an electrolyzing current of 1,500 amperes being used. This current has a potential of 110 volts, sufficient to carry it through 30 cells, each of which is provided with suitable electrodes and contains about 50 gallons of electrolyte. The electrolyte is a solution of caustic soda in water. About 800 cubic feet of gas an hour is the capacity of the plant.

**Weather Bureau Library.**—The library of the Weather Bureau is one of the very few collections of meteorological literature in this country, and much the largest. It contains approximately 34,000 books and pamphlets, practically all of which deal with meteorology or closely allied subjects. Nearly 200 scientific periodicals in various languages, mostly English, German, and French, are currently received and ultimately bound and filed for reference use.

This material is made available through the maintenance of a card catalogue (author and subject) of the books and pamphlets, and a similar record of the meteorological contents of all the principal scientific journals. A selected list of current accessions and a complete list of the periodical articles indexed are published each month in the *Monthly Weather Review*, under the section "Bibliography."

The library is open to employees of the department and to the public at large, from 9 a. m. to 4.30 p. m., and most of its books are available for circulation in connection with any serious scientific undertaking. It has been consulted by officials of other branches of the department mainly in connection with its practically exhaustive collection of climatic statistics relating to all parts of the world. These statistics are extremely heterogeneous in character, and there are striking contrasts in the extent to which climatic information relating to the different countries is available, as well as in the mode of presentation. While for some countries such information has been assembled in a comprehensive and systematic way, for others it is found scattered through a number of mutually independent memoirs, and is often of a very fragmentary character. Among examples of the more comprehensive works may be mentioned the great climatological atlases of India and Russia, an immense compilation of rainfall statistics for Germany (by Hellmann), the Weather Bureau's "Climatology of the United States" (Bulletin Q), and a recent work, by Maurer and others, on the climate of Switzerland.

Close contact with the work of other branches of the department will be found in the library's collections on agricultural meteorology, phenology, frost and frost protection, hailstorm insurance, lightning protection, evaporation, and quite a range of other topics pertaining to the border line between physical meteorology, on the one hand, and agriculture, horticulture, etc., on the other.

**Studies of atmospheric circulation.**—The circulation of the atmosphere is being investigated by the Weather Bureau in respect both to its larger and its more detailed aspects. One object of this investigation is to obtain an inventory of present knowledge of the winds, now so widely scattered through journalistic and other literature. Another object, and one more difficult of attainment, is to extend and improve the knowledge now possessed of the causes of and laws controlling wind movements of various kinds.

## CLIMATE AND PLANT GROWTH.

In the *Weather Review* (February) appeared a paper by Mr. Forman T. McLean on the relation of climate to plant growth in Maryland. The contribution deals with the behavior of a selected strain of the soy bean grown in identical soil at Easton and at Oakland, Md., during the summer of 1914. The factors of rainfall, evaporation, temperature, and sunshine are considered; the vegetal factor studied was the growth rate as measured by the production of dry matter in the stems and leaves of the plant.

Oakland and Easton differ materially in their climatic features, and the experiments have brought interesting results, which, however, are applied only to the plant form, the conditions, and period of observation treated.

With plentiful soil moisture in a light soil, a range of mean daily precipitation between 0.05 cm. and 0.50 cm., together with a low rate of evaporation, were without noticeable influence on the rate of growth in the first month. Apparently the growth was controlled by conditions other than that involving water. The rate increased to a maximum in the summer and then decreased. The "temperature efficiency" was relatively much more effective with high than with low temperatures. The growth rate varied almost directly with the "temperature index" when the air temperatures were low, this probably being general for the soy bean through a considerable range of conditions.

Under the given soil and soil-moisture conditions the intensity of evaporation experienced was never sufficiently high to overtax seriously the process of water absorption or conduction.

The seasonal changes in temperature were apparently much more important in controlling growth than were the changes in any other measured condition.

Comparing the seasonal march of the growth rate at Oakland with that at Easton it appears that—

(1) The two marches have much the same general form, but the top of the Easton curve is flat while the Oakland curve rises to a definite maximum and then rapidly falls.

(2) In general the Oakland rates are 10 to 20 per cent lower than the corresponding changes for Easton.

(3) The early occurrence of frost at Oakland (elevation about 2,500 feet) brought the season to a close earlier than at Easton (close to sea level), and the last growth rate for Easton appears markedly lower than any encountered at Oakland. This brings out a principle worthy of considerable emphasis—viz, a short frostless season with great daily temperature range causes a lowest growth rate generally higher than the lowest growth rate in a longer frostless season of more equable daily temperature ranges.

The Nation is spending through the department large sums in acquiring agricultural information. It would be little short of criminal to spend millions of dollars to acquire information and not to use every possible efficient agency available for placing it at the disposal of the people as promptly as possible, for it is certain that if the average farmer could be induced to apply what the experts now know or what the best farmers practice, a revolution could be brought about in the agriculture of the Nation.—*Annual Report, 1914.*



## CHEMISTRY NOTES.

*(Contribution from the Bureau of Chemistry.)*

The joint committee on definitions and standards met in Washington on June 1, 1915, for a week's session to consider various questions in connection with the determination of standards for food products. Since the last meeting of this committee in the early part of April a hearing was held in Chicago on the subject of flour and one in Washington on the subject of macaroni. At these hearings members of the trade presented information which will be considered by the committee in connection with proposing definitions and standards for various kinds of flour and for macaroni and similar alimentary pastes. While in session in Washington the committee accorded the coffee trade a hearing on June 4 on the labeling of Java coffee, and on June 5 held another hearing on flour.

The joint committee on definitions and standards consists of C. L. Alsberg, R. L. Emerson, and I. K. Phelps, of the Bureau of Chemistry, representing the Department of Agriculture; W. F. Hand, Agricultural College, Miss.; E. F. Ladd, Agricultural College, N. Dak.; and H. E. Barnard, Indianapolis, Ind., representing the Association of American Dairy, Food, and Drug Officials; J. P. Street, New Haven, Conn., Julius Hortvet, St. Paul, Minn., and William Frear, State College, Pa., representing the Association of Official Agricultural Chemists. The standards and definitions proposed by this committee are intended for the guidance of Federal and State officials in the enforcement of food laws.

**Oil of chenopodium.**—Experiments made to determine accurately the resistance of various animals to oil of chenopodium, which is used in the treatment of hookworm and of roundworm, are described in a paper on "The Toxicity of Oil of Chenopodium," by William Salaut and E. K. Nelson of the Bureau of Chemistry, published in the March, 1915, number of *The American Journal of Physiology*. The toxicity of chenopodium in animals was found to be distinctly increased in starvation and decreased by feeding vegetable oils and by feeding a rich carbohydrate diet. Cumulative effects were observed in different animals. Circulation and respiration were depressed.

According to information given in literature many people have undoubtedly been poisoned by oil of chenopodium through lack of knowledge of its toxicity. It should be given with great care, as it is poisonous even in comparatively small doses, and especially so to people who are feeble, underfed, or in ill health.

**Tannery waste liquids.**—How to dispose economically of the large volume of waste liquids that are incident to the

tanning processes without at the same time causing the pollution of surface waters has become a pressing problem in the tanning industry. Practical suggestions for the solution of this problem are made in a paper which was read by F. P. Veitch, of the Bureau of Chemistry, at the eleventh annual meeting of the American Leather Chemists' Association, in Chicago, and published in the March, 1915, number of the journal of that association under the title "The Purification of Tannery Effluents and the Recovery of By-Products Therefrom."

After a general review of the work done on sewage purification and the recovery of trade wastes, specific suggestions are made for the handling of tannery waste liquids. The volume of the waste liquids, which vary in different tanneries from 100 to 500 gallons per day per hide, should be kept as small as possible without injuring the main product, leather. The wastes from the different tanning operations should be analyzed in order to determine what liquids may be run direct to the sewer without purification and to give definite information as to the total volume and composition of the liquid wastes that must be purified.

The waste limes should be settled, separated, and dried, after which they can be disposed of to farmers. The importance of lime in agriculture is being more and more realized by farmers and experiment-station workers. The dried sludges that are obtained from the tannery effluents are valuable in the manufacture of fertilizer, bringing from \$4 to \$6 per ton, the value depending upon the nitrogen and phosphoric acid which the material contains. It is probable that undried sludge can be disposed of directly to farmers as soon as they are made aware of its fertilizing value, which is about equal to barnyard manure. The paper suggests that the experiment stations can perform a useful service, not only to the farmers but to the tanning industry, by calling the attention of the farmers to the fertilizing value of this by-product of the tannery.

A constructive agricultural program must of necessity contemplate distribution as well as production, and, vital and urgent as are the direct problems of production, even more important in a sense and more immediately pressing are the problems of distribution and marketing. The solution of problems in this field is essential not only for the increase of production but also for the elimination of injustice, and for the guaranty, on the one hand, to the producer that he shall receive a fair reward for his labor and the right value for the specific product which he sells, and, on the other, to the consumer that he shall receive the exact commodity for which he pays a specific price.—Annual Report, 1914.

## THE SOIL SURVEY.

*(Contribution from the Bureau of Soils.)*

The ultimate object of the work of the Soil Survey is to construct a soil map of the United States. The value of a work of this kind lies to a very great extent in the uniformity of methods used over the whole country, uniformity of definition of soil units, and uniformity of nomenclature. While it would be possible for each State to construct a soil map covering the area of that State and to do it well, the result would probably not be uniform over two or more States with respect to any of the above-mentioned things, and while the soils within each State could be compared, yet there would be no basis of comparison for those in different States.

A soil map is valuable not only because of the absolute information contained in it and the descriptive matter accompanying it, but also because of the comparative data that it supplies. When constructed on a uniform basis the soils of one locality may be compared with those of another in productive power, stage of development, origin, and adaptabilities. It should supply data for comparative study of inherent soil wealth, as well as suggestions as to the necessary, or at least preferable, trend of agricultural development in the future.

The work could be carried on by commencing at one side and working thence over the whole country completely, leaving behind nothing unfinished and having in front nothing finished or even begun, or it could be carried on in more or less isolated units widely scattered over the whole or a large part of the country. Although it is recognized that the full value of a soil survey can not be realized until all or at least a larger part of the country has been covered, yet the distribution of the work over a wide area of country each season has the two decided advantages of supplying immediate positive information to persons or institutions over a wide area of country and of furnishing in the shortest time possible, consistent with the cost of the work, the broadest possible knowledge of the soils of the United States. It has been the policy of the Bureau of Soils from the beginning to distribute the Soil Survey work over a wide area of country each year. As a result, although only about 24 per cent of the total area of the United States has been covered, soils have been studied in all parts of the country under all conditions of soil making that are at least widely prevalent and under all sorts or kinds of initial material, so that we have already become somewhat familiar probably with all the very important soils in the United States and have accumulated a great deal of data concerning their distribution.



## SELECTION OF PROJECTS.

The projects to be taken up each season are selected by the Chief of the Bureau of Soils and approved by the Secretary of Agriculture in accordance with the demands for the work as expressed by requests from individuals, associations, State officials, or Government officials. Since the information obtained by the work is considered fundamental for much other State and Government work, especially the work of the State experiment stations and the Office of Farm Management, especial attention is given to requests coming from those sources. In some States the work is carried on in cooperation with some one of the State institutions. In most cases this is the agricultural experiment station. In the case of one State it is the department of agriculture, and in four it is the State geological survey. In all these States part of the expense of the work is borne by State appropriations, the usual plan being that the State employs the same number of men as that supplied by the Bureau, the field subsistence of each man being paid by the organization employing him. Livery or other joint expenses are divided equally. The cost of inspection and publication is borne by the Government.

## LAND CLASSIFICATION.

Although the main work of the Soil Survey consists of its prosecution of the detailed mapping of its several soil-survey projects, yet it prosecutes work along three other lines. In cooperation with the Forest Service, the Soil Survey is engaged in the study of certain areas in the National Forests for the purpose of acquiring soil data to be used in the determination of what parts of such areas are agricultural in character and what parts are nonagricultural. This work has been in progress, mainly during the summer season, for some three years.

In cooperation with the Reclamation Service of the Interior Department the soil survey is engaged in the study of certain areas in or near the reclamation projects in the West, with the object of determining the adaptability of certain areas to irrigation. These data are used as a guide to the service in the extension of the area under irrigation in the project examined.

## RELATION OF SOILS TO CROPS.

For several years the soil survey has been engaged in the special study of the relation of soil types, as defined by the soil survey, to the kind of crops as well as to the yield. The work was begun with the double purpose of obtaining definite information as to what conclusions can be drawn concerning this relationship from a study of the crops

actually grown by farmers on certain soil types and also to determine what the crop has to say about the results so far reached by us in our soil definition and differentiation. The data first mentioned may be used in the further development of agriculture by those institutions concerned in that work, while the last is valuable to the Soil Survey in its future work. During the coming season this work will be carried on in the trucking regions of New Jersey, finishing up a project begun a year ago, and in the latter part of the summer it is hoped that the work can be extended into Maryland.

The soil survey work is field work. Soils are defined in terms of characteristics observable in the field by field methods, with incidental or subordinate assistance or suggestions from the laboratories. Soils are differentiated on the basis of soil characteristics, such as content of organic matter as expressed in color, extent of leaching to which it has been subjected as expressed by the lime content, the stage of development reached, the degree of aeration, as expressed in the color, mainly of the subsoil, and by the evidences of good or poor drainage, the character of the rock from which the soil material was derived, the processes by which the soil material was accumulated, the stage of decomposition of the organic matter, and the structure or granulation of the soil and subsoil.

## ARRANGEMENT OF FIELD WORK.

Soil survey field work is carried on throughout the year. During the winter it is confined to the Southern States and California and during the summer to the Northern States. In a few of the States work is continued throughout the year, though the number of projects in the summer season is less than in the winter. The work is arranged so that the field parties are transferred to the southern areas between the middle of November and the first of January, depending partly on the state of the weather in the Northern States and the time of completing the work in the summer season projects. The transfer back to the northern areas takes place as a rule between the first of May and the middle of June, depending again partly on the weather in the Northern States and the date of completion of the winter projects. The attempt is made to complete two series of projects each year, one in the Northern States and one in the Southern States. Since our project unit, however, is as a rule a county and these vary greatly in size, we are unable, in some cases, to complete a project in one season. In case such a project lie in a Northern State work on it must be suspended during the winter. If it lie in a Southern State it may or may not be suspended during the summer season, depending upon circumstances.

## STATION PUBLICATIONS.

(Contribution from the Office of Experiment Stations.)

The station publications noted in this list are not distributed by the Department of Agriculture, but can usually be obtained by department workers, as far as the supply will permit, by applying to the stations issuing them. An address list of the stations will be furnished upon request by the Office of Experiment Stations. Copies of these publications can be consulted in the library of that office and also ordinarily can be borrowed from the department library.

## CROPPING SYSTEMS AND SOIL STUDIES.

- A new and Prolife Variety of Cotton. (Alabama Tuskegee Station Bulletin 23, pp. 7, fig. 1.)
- Irrigation and Soil Conditions in the Sierra Nevada Foothills, California. By R. D. Robertson and J. W. Nelson. (California Station Bulletin 253, pp. 323-378, figs. 25.)
- Soil Experiments on the Level Prairies of Northeast Missouri. By M. F. Miller, C. B. Hutchison, and R. R. Hudelson. (Missouri College Station Bulletin 126, pp. 317-354, figs. 6.)
- Soil Experiments on the Dark Prairies of Central and Northeast Missouri. By M. F. Miller, C. B. Hutchison, and R. R. Hudelson. (Missouri College Station Bulletin 127, pp. 355-384, figs. 7.)
- Soil Experiments on the Rolling Glacial Land of North Missouri. By M. F. Miller, C. B. Hutchison, and R. R. Hudelson. (Missouri College Station Bulletin 128, pp. 385-401, figs. 4.)
- Soil Experiments on the Red Limestone Upland of Southwest Missouri. By M. F. Miller, C. B. Hutchison, and R. R. Hudelson. (Missouri College Station Bulletin 129, pp. 403-421, figs. 5.)
- Soil Experiments on the Gray Prairie of Southwest Missouri. By M. F. Miller, C. B. Hutchison, and R. R. Hudelson. (Missouri College Station Bulletin 130, pp. 423-442, figs. 4.)
- Soy Beans and Coxpeas. By T. A. Kiesselbach. (Nebraska Station Bulletin 150, pp. 31, figs. 6.)
- Dry Farming Investigations in Western North Dakota. By J. C. Thysell, H. C. McKinstry, R. S. Towle, and A. J. Ogaard. (North Dakota Station Bulletin 110, pp. 159-207, figs. 11.)
- Field Beans—A Profitable West Virginia Crop. By I. S. Cook. (West Virginia Station Circular 18, pp. 11, figs. 5.)
- Growing Forage Crops for Hogs. By R. R. Snapp. (West Virginia Station Circular 19, pp. 4.)
- A New Test for Soil Acidity. By E. Truog. (Wisconsin Station Bulletin 249, pp. 3-16, pl. 1, figs. 3.)

## ANIMAL INDUSTRY.

- Chickens—Milk Feeding and Its Influence on Growth and Mortality—Comparative Study of the Value of Sweet and Sour Milk. By L. F. Rettger, W. F. Kirkpatrick, and L. E. Card. (Connecticut Storrs Station Bulletin 80, pp. 3-23, figs. 17.)
- Bect Residues for Farm Stock. By J. B. Lindsey. (Massachusetts Station, Circular 48, pp. 7.)
- Rations for Dairy Stock. By J. B. Lindsey. (Massachusetts Station Circular 50, pp. 8.)
- Pork Production. By W. P. Snyder. (Nebraska Station Bulletin 147, pp. 5-56, figs. 5.)
- Raising the Dairy Calf. By E. G. Woodward. (Nebraska Station Bulletin 149, pp. 3-16, figs. 8.)

## FRUITS.

- How to Grow Muskmelons. By J. W. Lloyd. (Illinois Station Circular 139, 2d edition, revised, pp. 18, figs. 8.)



- Making Old Orchards Profitable. By L. Greene. (Iowa Station Circular 20, pp. 3-32, figs. 14.)
- Strawberry Varieties. By O. M. Taylor. (New York State Station Bulletin 401, pp. 165-192.)
- Now or Noteworthy Fruits, III. By U. P. Hedrick. (New York State Station Bulletin 403, pp. 211-220, pls. 4.)
- Tomatoes for North Dakota. By H. O. Werner. (North Dakota Station Bulletin 111, pp. 209-232, figs. 3.)
- Experimental Results in Young Orchards in Pennsylvania. By J. P. Stewart. (Pennsylvania Station Bulletin 134, pp. 3-20, figs. 3.)
- Citrus Fertilization Experiments in Porto Rico. By C. F. Kiuman. (Porto Rico Station Bulletin 15, pp. 33, pls. 2.)

## RURAL ECONOMICS.

- The Cost of Production on Missouri Farms. By O. R. Johnson and W. E. Foard. (Missouri College Station Bulletin 125, pp. 287-316, figs. 5.)
- The Cost of Milk Production. By H. A. Hopper and F. E. Robertson. (New York Cornell Station Bulletin 357, pp. 135-162, figs. 6.)
- Markets and Prices of Wisconsin Cheese. By B. H. Hibbard and A. Hobson. (Wisconsin Station Bulletin 251, pp. 3-56, figs. 22.)

## INSECTS AND ANIMAL PARASITES.

- Some Common Spray Mixtures. By O. S. Watkins. (Illinois Station Circular 160, 3d edition, revised, pp. 19.)
- Four Aphids Injurious to the Apple. By B. S. Pickett. (Illinois Station Circular 179, pp. 4.)
- The Hessian Fly. By R. L. Webster. (Iowa Station Circular 22, pp. 4, figs. 6.)
- The Control of the San Jose Scale in Missouri. By L. Haseman. (Missouri College Station Bulletin 132, pp. 9, figs. 3.)
- The Status of Spraying Practices for the Control of Plant Lice in Apple Orchards. By P. J. Parrott and H. E. Hodgkiss. (New York State Station Bulletin, 402, pp. 193-210, pls. 2, figs. 2.)
- Some Important Animal Parasites Affecting Ohio Live Stock. By D. C. Mote. (Ohio Station Bulletin 280, pp. 23-52, figs. 21.)
- Corn and Cotton Wireworm (*Horistonotus uhleri*). By A. F. Conrad and H. C. Egerton. (South Carolina Station Bulletin 180, pp. 16, pls. 4.)

## PLANT DISEASES.

- Corn Stalk and Corn Root Diseases in Iowa. By L. H. Pammel, Charlotte M. King, and J. L. Seal. (Iowa Station Circular 21, pp. 3-8, figs. 2.)
- Apple Rust or Cedar Rust in West Virginia. By N. J. Giddings and A. Berg. (West Virginia Station Circular 15, pp. 16, figs. 7.)

## INSPECTION AND METEOROLOGY.

- Milk and Cream. (Maine Station Official Inspections 67, pp. 9-28.)
- Meteorological Observations at the Massachusetts Agricultural Experiment Station. By J. E. Ostrander and R. E. McLain. (Massachusetts Station Meteorological Bulletin 316, pp. 4.)
- The Fertilizer Law and Rules and Regulations for Its Enforcement. By B. H. Hite. (West Virginia Station Circular 16, pp. 11, fig. 1.)
- Potato Seed Certification in Wisconsin. By J. G. Milward. (Wisconsin Station Bulletin 252, pp. 3-11, fig. 1.)

## MISCELLANEOUS.

- The Deterioration of Lumber. By M. B. Pratt. (California Station Bulletin 252, pp. 299-320, figs. 8.)
- Kansas Flours: Chemical, Baking, and Storage Tests. By C. O. Swanson, J. T. Willard, and L. A. Fitz. (Kansas Station Bulletin 202, pp. 3-135, figs. 21.)
- An Experimental Study of the Rest Period in Plants. By W. L. Howard. (Missouri College Station Research Bulletin 16, pp. 3-27, figs. 12.)
- Fibrin. By A. W. Bosworth. (New York State Station Technical Bulletin 41, pp. 3-6.)

## AIDS IN USING LIBRARY.

(Contribution from the department library.)

The most important key to the collections in the library is the main card catalogue. There are, however, many other keys or bibliographies which open up the literature of special subjects and make available much material that might otherwise elude the searcher. These published bibliographies supplement the catalogue and are an important part of the equipment of the library. For the benefit of those who prefer to help themselves in looking up the literature of their subjects, it may be of assistance to name a few more important ones.

The Royal Society catalogue is an index, arranged by authors, of the scientific papers contained in the transactions of societies, journals, and other periodical works which were published from 1800 to 1900. The International catalogue of scientific literature, commencing with the literature of 1901 and published annually since that date, is the outgrowth of the Royal Society catalogue. It is, however, not only an author list but a subject index also, and is a valuable key to the literature of science.

The International Institute of Agriculture in Rome reviews the scientific, technical, and, in part, the legislative literature of agriculture and the allied industries; and publishes these reviews in the form of a monthly bulletin, which furnishes a periodical summary of the agricultural literature of the world.

The Experiment Station Record, published monthly, furnishes an index to the publications of the State experiment stations and includes also in its reviews other publications, both in this and foreign countries, which are important contributions to the literature of agriculture or the allied sciences. As a large majority of the books and periodicals referred to in the Record are contained in this library, it is an especially valuable supplement to the catalogue of the library. There is also on file in the library, adjoining the main card catalogue, the Card Index of Experiment Station Literature, published by the Office of Experiment Stations. This is a classified index and therefore can not be incorporated with the main catalogue.

Poole's index to periodical literature, published in six volumes, from 1832 to 1906, and its successor, the Reader's Guide, which comes out every month with frequent accumulations, were designed to make accessible the great amount of valuable matter issued in the magazines of this and other countries. These sets index many of the older and more valuable magazines from their beginning and keep abreast of the current ones of high standing. Both authors and subjects are contained in the same alphabet.

It has not seemed advisable for the library to catalogue fully all the publications of the United States Government. The publications of the Department of Agriculture are fully catalogued, and a few of the more important publications of other departments, but the compendious indexes issued by the office of the Superintendent of Documents make it unnecessary to include cards in our catalogue for the bulk of the publications of the other departments of the Government.

The library is engaged in making an index to the reports and transactions of the State boards of agriculture and the State agricultural societies. Only about one-third of this work is finished and the cards are not included in the general catalogue, but they can be consulted at any time by asking one of the assistants.

The above indexes and bibliographies, which are all on file in the reference room near the catalogue, are only a few of the more important of those contained in the library. They are sufficient, however, to make it evident that when a subject is not found in the main catalogue one of the reference assistants should always be consulted before it is assumed that the library contains no material on that subject.

If time is a vital consideration, or if the subject to be investigated is likely to require considerable research, it is suggested that it would be advisable for a memorandum to be sent to the library some hours or a day before a visit is planned, asking that material on the subject to be investigated be collected in the reading room and reserved for consultation by the inquirer. This would frequently result in saving much time to the inquirer, since the books needed must sometimes be recalled from various offices where they are filed. In making such requests it is important that they be as definite and specific as possible, as this will make it easier to eliminate material not pertinent.

A request for information or for assistance in looking up a subject should never be considered an unreasonable demand on the time of the assistants, inasmuch as the furnishing of information needed in connection with department work is one of the main reasons for the existence of the library. If the library can not itself furnish the information desired it may be able to refer the inquirer to some source whence it may be obtained.

## SELECTED LIST OF ACCESSIONS.

May, 1915.

## AGRICULTURE.

- Call, L. E., and Kent, H. L., comp. Agriculture for the Kansas common schools. 463 p. Topeka, 1914.
- Davis, F. W. Corn culture. 49 p. Austin [1915] (Texas. Dept. of agriculture. Bulletin, no. 41)
- Davis, F. W. Peanut culture. 6 p. Austin, 1915. (Texas. Dept. of agriculture. [Bulletin] n. s. no. 15)
- Davis, F. W. Sudan solves problem. 4 p. Austin, 1915. (Texas. Dept. of agriculture. Bulletin, n. s. no. 16)



- Groothoff, A. De kinacultuur. 109 p. Haarlem, 1912. (Onze koloniale landbouw, onder redactie van J. Dekker. III)
- International rubber congress and exhibition, Batavia, 1914. Rubber recuil. 609 p. Amsterdam, 1914.
- Ivins, L. S., and Merrill, F. A. Practical lessons in agriculture. 223 p. New York [1915]
- Jumelle, H. L. Les cultures coloniales. 2. 6d. v. 5. Paris, 1914.
- Mitteldeutsche gesellschaft für waldwirtschaft und viehzucht. Arbeiten, hft. 1. Hannover, 1914.
- Mulder, J. S. De rietsuikerindustrie op Java. 99 p. Haarlem, 1912. (Onze koloniale landbouw, onder redactie van J. Dekker. I)
- Paerels, J. J. Derijst. 96 p. Haarlem, 1913. (Onze koloniale landbouw, onder redactie van J. Dekker. V)
- Parker, E. C. Field management and crop rotation. 507 p. St. Paul, 1915.
- Tohoku imperial university—College of agriculture, Sapporo, Japan. American influence upon the agriculture of Hokkaido, Japan. 21 p. Sapporo, 1915.
- Uttée, A. J. Caoutchouc. 95 p. Haarlem, 1913. (Onze koloniale landbouw, onder redactie van J. Dekker. IV)
- Werner, Carl. A textbook on tobacco. 323 p. New York [1914]
- Wrightson, John, and Newsham, J. C. Agriculture, theoretical and practical. 628 p. London, 1915.
- Zehntner, Leo. Le cacaoyer dans l'état de Bahia. 156 p. Berlin, 1914.

## AGRICULTURAL ENGINEERING.

- Clarkson, R. P. Practical talks on farm engineering. 223 p. Garden City, N. Y., 1915.

## SOILS AND FERTILIZERS.

- Bailey, G. E. Nitrating the soil by inoculated legumes. 36 p. [Los Angeles, 1915] (University of Southern California. Publications. vol. 2, no. 1. March, 1915)
- Leather, J. W. Investigations on usar land in the United Provinces. 88 p. Allahabad, 1914.
- Quear, C. L. 39 experiments in soils. 90 p. [Muncie, Ind., 1915]
- Schneidewind, Wilhelm. Die ernährung der landwirtschaftl. kulturpflanzen. 487 p. Berlin, 1915.

## HORTICULTURE.

- Hariot, Paul. Le livre d'or de roses. 130 p. Paris [1903]
- Lowther, Granville, ed. The encyclopedia of practical horticulture. 3 v. North Yakima, Wash. [1914]
- Massachusetts—State board of agriculture. Small fruits and berries. 152 p. Boston, 1914.
- Ramsay, A. A. Lime-sulphur sprays. 19 p. Sydney, 1915. (New South Wales. Dept. of agriculture. Science bulletin, no. 13)
- Rexford, E. E. A-B-C of gardening. 114 p. New York, 1915.
- Savastano, Luigi. Arboricoltura. 848 p. Napoli, 1914.
- Wickson, E. J. California garden-flowers, shrubs, trees and vines. 262 p. San Francisco, 1915.

## FORESTRY.

- Associated factory mutual fire insurance companies. Dry rot in factory timber. 2d ed. 107 p. Boston [1915]
- Congrès forestier international, Paris, 1913. Congrès forestier international tenu à Paris du 16 au 23 juin 1913. 961 p. Paris [1913]
- House, H. D. Certain features of German forestry. 30 p. Albany, 1915.
- Lugt, C. S. Het boschbedrijf in Nederlandsch Indië. 124 p. Haarlem, 1912. (Onze koloniale landbouw, onder redactie van J. Dekker. II)
- Shaw, Norman. Chinese forest trees and timber supply. 351 p. London [1914]

## DOMESTIC ANIMALS.

- American school of poultry husbandry. Lesson no. 23-25. Mountain Grove, Mo., 1915.
- Conover, U. G. A B C of Belgian bare culture. 48 p. [Cincinnati, 1915]
- Cooper, H. St. J. Bulldogs and all about them . . . with special sections by C. J. Browne. 358 p. London [1915]
- Harper, M. W. Breeding of farm animals. 335 p. New York, 1914.
- Jowett, F. M. The complete story of the Airedale terrier. 191 p. New York, 1913.
- Lee, R. B. A history and description of the modern dogs of Great Britain and Ireland. 4th ed. 2 v. London [1914]
- National pet stock association of America. Standard of perfection for rabbits, cavies, mice, rats & skunks. 32 p. [Waukegan, Ill., 1915]
- Woll, F. W. Productive feeding of farm animals. 362 p. Philadelphia [1915]

## VETERINARY MEDICINE.

- Greenwood, Major. Report to the council of the National pig breeders' association, on the present knowledge of swine fever. 69 p. Borrowash, Derby, 1914.
- Olt, A., and Ströse, A. Die wildkrankheiten und ihre bekämpfung. 633 p. Neudamm, 1914.

- Schoenleher, F. S., and Dykstra, R. R. Castration of domesticated animals. 154 p. New York, 1915.

## CHEMISTRY AND PHYSICS.

- Billing, G. T., and Walker, A. H. Meat and food inspectors' examinations. [2d ed.] 189 p. London, 1914.
- [Booth, C. E.] Audels answers on refrigeration and ice making. 689 p. London, New York [1914]
- Chamot, E. M. Elementary chemical microscopy. 410 p. New York, 1915.
- Cosgrove, J. J. Sanitary refrigeration and ice making. 331 p. Pittsburgh [1914]
- Handbuch der nahrungsmitteluntersuchung. 1lg. 26-27. Leipzig, 1914.
- Levy, S. I. The rare earths. 345 p. London, 1915.
- Meyer, V. J. Lehrbuch der organischen chemie. bd. 2, t. 3, abt. 1. 1. und 2. aufl. Leipzig, 1915.
- Popp, Max. Die eisenzitrath-methode zur bestimmung der zitroneisensäurelöslichen phosphorsäure in thosmehlen. 29p. Berlin, 1915.
- Stern, Lina. Über den mechanismus der oxydationsvorgänge im isororganismus. 61 p. Jena, 1914.
- Stutzer, Alfred, and Haupt, W. Dreijährige versuche über die wirkung von chormagnesium enthaltender erdlaug von chlorkaliumfabriken auf die ernteträge. 84 p. Berlin, 1915.
- Tibbe, Ludwig. Die fabrikation von leim und gelatine. 158 p. Leipzig [1907]
- Ullmann, Fritz. Enzyklopädie der technischen chemie. v. 2. Berlin, 1915.
- Wahl, André. The manufacture of organic dyestuffs. Authorised translation . . . by F. W. Atack. 333 p. London, 1914.

## PHARMACY.

- American institute of homeopathy—Committee on pharmacopoeia. The homeopathic pharmacopoeia of the United States . . . 3d ed. 680 p. Boston, 1914.

## HOME ECONOMICS.

- Glenwood, Fla., Presbyterian church. How we cook with citrus fruits in Florida. 16 p. Glenwood [1914]
- Lancaster, Mrs. M. L. Electric cooking, heating and cleaning. . . ed. by E. W. Lancaster. . . American ed. 323 p. New York, 1914.
- Larned, Mrs. L. H. One hundred luncheon dishes. 109 p. New York, 1915.
- Lincoln, Mrs. M. J. The school kitchen textbook. 308 p. Boston, 1915.
- Moore-Williams, G. W. Report . . . on the freezing point of milk . . . in its relation to the detection of added water. 32p. London, 1914. (Gt. Brit.—Local government board. Reports on public health and medical subjects. n. s. no. 103. Food reports, no. 22)
- Rich, J. P. Cooking tough meats. 12 p. Austin, Tex. [1914] (Bulletin of the University of Texas. no. 344. Extension ser. no. 53)
- Rich, J. P. Food for growing children. 20 p. Austin, Tex. [1914] (Bulletin of the University of Texas. no. 342. Extension ser. no. 51)
- Rich, J. P. The Irish potato. 13 p. Austin, Tex. [1914] (Bulletin of the University of Texas. no. 350. Extension ser. no. 56)
- Rich, J. P. Nuts and their uses as food. 20 p. Austin, Tex. [1914] (Bulletin of the University of Texas. no. 366. Extension series no. 63)
- Rich, J. P. The uses of food and the proper balancing of the diet. 12 p. Austin, Tex. [1914] (Bulletin of the University of Texas. no. 345. Extension ser. no. 53)
- Richards, Paul. Pastry for the restaurant. 144 p. Chicago [1915]
- Richardson, A. E. Principles of menu making. (2d ed.) 20 p. Austin, Tex. [1914] (Bulletin of the University of Texas. no. 333. Extension ser. no. 47)
- Texas—University—Dept. of extension—Division of home welfare. Meat, its value as a food, and its proper preparation. 19 p. Austin, Tex. [1914] Bulletin of the University of Texas. no. 347. Extension ser. no. 54)
- Texas—University—Dept. of extension—Division of home welfare. Seasonable fruits and their uses. 14 p. Austin, Tex. [1914]
- Williams, Florence. Dainties for home parties. 88 p. New York, 1915.
- Wright, M. M. Candy-making at home. 188 p. Philadelphia, 1915.

## BOTANY.

- Arnold arboretum—Library. Catalogus. v. 1. Cambridge, 1914.
- Brenchley, W. E. Inorganic plant poisons and stimulants. 110 p. Cambridge, 1914.
- Cohn, F. J. Beiträge zur biologie der pflanzen. bd. 12, pt. 3. Breslau, 1914.
- Coley, May, and Weatherby, C. A. Wild flower preservation. 197 p. New York [1915]
- Cowles, H. C., and Coulter, J. G. A spring flora for high schools. 144 p. New York [1915]
- Douglas, David. Journal kept . . . during his travels in North America, 1823-1827. 364 p. London, 1914.
- Fawcett, William, and Rendle, A. B. Flora of Jamaica. v. 3. London, 1914.
- Ferraris, Teodoro. I parassiti vegetali delle piante coltivate od utili. 1032 p. Milano, 1915.
- Gatin, C. L. Les fleurs des bois. 115 p. Paris, 1913.
- Green, J. R. A history of botany in the United Kingdom from the earliest times to the end of the 19th century. 648 p. London, 1914.

- Hayek, August, edler von. Die pflanzendecke Österreich-Ungarns. bd. 1, 1lg. 2-3. Leipzig und Wien, 1914.
- Howard, Albert. Influence of the environment on the milling and baking qualities of wheat in India. no. 3. The experiments of 1911/12. Calcutta [1914] (India. Dept. of agriculture. Memoirs. Botanical ser. v. 6, no. 8.)
- Ito, Tokutaro. Icones plantarum japonicarum. v. 1, no. 1-3. Tokyo, 1911-12.
- Kölster, Ernst. Pathological plant anatomy. Tr. by Frances Dorrance. 256 numb. 1. [n. p., 1915] Multi-graphed.
- Mathews, F. S. Field book of American trees and shrubs. 465 p. New York, 1915.
- Murrill, W. A. American boletes. 40 p. New York, 1914.
- Murrill, W. A. Northern polypores. 64 p. New York, 1914.
- Murrill, W. A. Southern polypores. 68 p. New York, 1915.
- Saccardo, P. A. Hymeniales. pt. 1. Rocca S. Casciano, 1915.
- Sahasrabuddhe, D. L. The acid secretion of the gram plant, Cicer arietinum. 12 p. Calcutta, 1914.
- Schlechter, Rudolf. Die orchideen. 1lg. 7-9. Berlin, 1914-15.
- Sorauer, Paul. Manual of plant diseases. . . 3d ed. Tr. by Frances Dorrance. v. 1, pt. 2. Wilkes-Barre, Pa., 1915.

## BIOLOGY AND ZOOLOGY.

- Buttel-Reepen, H. B. von. Lehen und wesen der hienen. 300 p. Braunschweig, 1915.
- Chun, C., ed. Allgemeine biologie. 691 p. Leipzig, 1915.
- Dewar, Douglas. Birds of the Indian hills. 263 p. London, 1915.
- Fletcher, T. B. Some south Indian insects and other animals of importance. 565 p. Madras, 1914.
- Forbush, E. H. Rats and rat riddance. 87 p. Boston, 1915. (Massachusetts. State board of agriculture. Economic biology. Bulletin no. 1. Dec. 1914)
- Kellogg, V. L., and Doane, R. W. Elementary textbook of economic zoology and entomology. 532 p. New York [1915]
- Mordvilko, A. K. Insectes hémiptères. v. 1, livr. 1. Petrograd, 1914.
- Reichenow, Anton. Die vögel. v. 2. Stuttgart, 1914.
- Schenklung, Sigmund, ed. Coleopterorum catalogus. pt. 62. Berlin, 1914.
- Waterhouse, G. A., and Lyell, George. The butterflies of Australia. 239 p. Sydney, 1914.

## ECONOMICS AND STATISTICS.

- Carver, T. N. Essays in social justice. 423 p. Cambridge, 1915.
- Gibbins, H. de B. Economic and industrial progress of the century. 524 p. London, 1903.
- Ireland—Dept. of agriculture and technical instruction—Committee on agricultural credit. Minutes of evidence. London, 1914. (Gt. Brit. Parliament. Papers by command [Cd. 7376])
- Lewis, E. St. E. The rules of the game. 54 p. Chatham, N. Y. [1913]
- Pearson, R. A. Agricultural organizations in European countries. p. [449]-636. Albany, 1914. (New York. Dept. of agriculture. Bulletin 66)
- Plunkett, Sir H. C., and others. The United Irish women. 50 p. Dublin [1911]
- Weld, L. D. H. Social and economic survey of a community in the Red River valley. 88 p. Minneapolis, 1915. (The University of Minnesota. Current problems, no. 4)
- Weld, L. D. H. Studies in the marketing of farm products. 113 p. Minneapolis, 1915. (The University of Minnesota. Study in the social sciences, no. 4)

## ADDITIONS TO LIST OF PERIODICALS CURRENTLY RECEIVED.

- Agricultura e pecuaria; boletim mensal do "Jornal do Brasil." Rio de Janeiro.
- Herkimer County (N. Y.) farm bulletin [monthly] [Herkimer]
- Journal of parasitology; a quarterly. Urhuna, Ill.
- Modern grocer [weekly] Chicago, Ill.
- Nation's business [monthly] Washington, D. C.
- Oil miller [monthly] Atlanta, Ga.
- Stock yards nugget [weekly] Kansas City, Kan.
- Useful poultry journal [monthly] [Mountain Grove, Mo.]
- Utah—Agricultural college—Extension division. Circular. Cedar City.
- West Virginia—University—College of agriculture—Extension dept. Circular. Morgantown.

All agricultural enterprises and the work of all agricultural establishments are economic in their character, and yet it is true that up to the last two years neither the farm as such nor any institution or establishment dealing with the farm has invoked the assistance of the economist. For the most part the economist has not realized the obligation resting upon him and has paid scant attention to the urgent economic problems in the field of rural life.—Annual Report, 1914.